

The Chemical Age


VOL. LXXVI No. 1953

15 December 1956

**RAMSAY
DINNER**

(See page 440)

It's
“Metal
Containers”
Age



METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON

WORKS: ELLESMERE PORT & RENFREW.

ASSOCIATED COMPANIES OVERSEAS

CALLOW ROCK*Gas-Burnt***LIME***for all purposes*

...

QUICKLIME*(Calcium Oxide)*of the highest commercial quality, in lumps
or in coarse powder form**HYDRATED LIME***(Calcium Hydroxide)*in Standard and Superfine grades to meet
most industrial requirements

...

The Callow Rock Lime Co. Ltd.
CHEDDAR, SomersetAgents: DURHAM RAW MATERIALS, LTD.,
1-4 Great Tower Street, LONDON, E.C.3**CROMIL & PIERCY LTD.**

REGD. CROMIL

GRAPHITE
IN ALL FORMS**MILBURN HOUSE**
"E" FLOOR
NEWCASTLE-ON-TYNE

Tel.: 2-7761

"REDAC"
PRODUCTS**ACID RESISTING
EARTHENWARE***Enquiries Welcomed***B. WHITAKER & SONS, LTD.****ST. STEPHENS HOUSE, WESTMINSTER**

Phone : Whitehall 3616

Works : ACCRINGTON, LANCs.

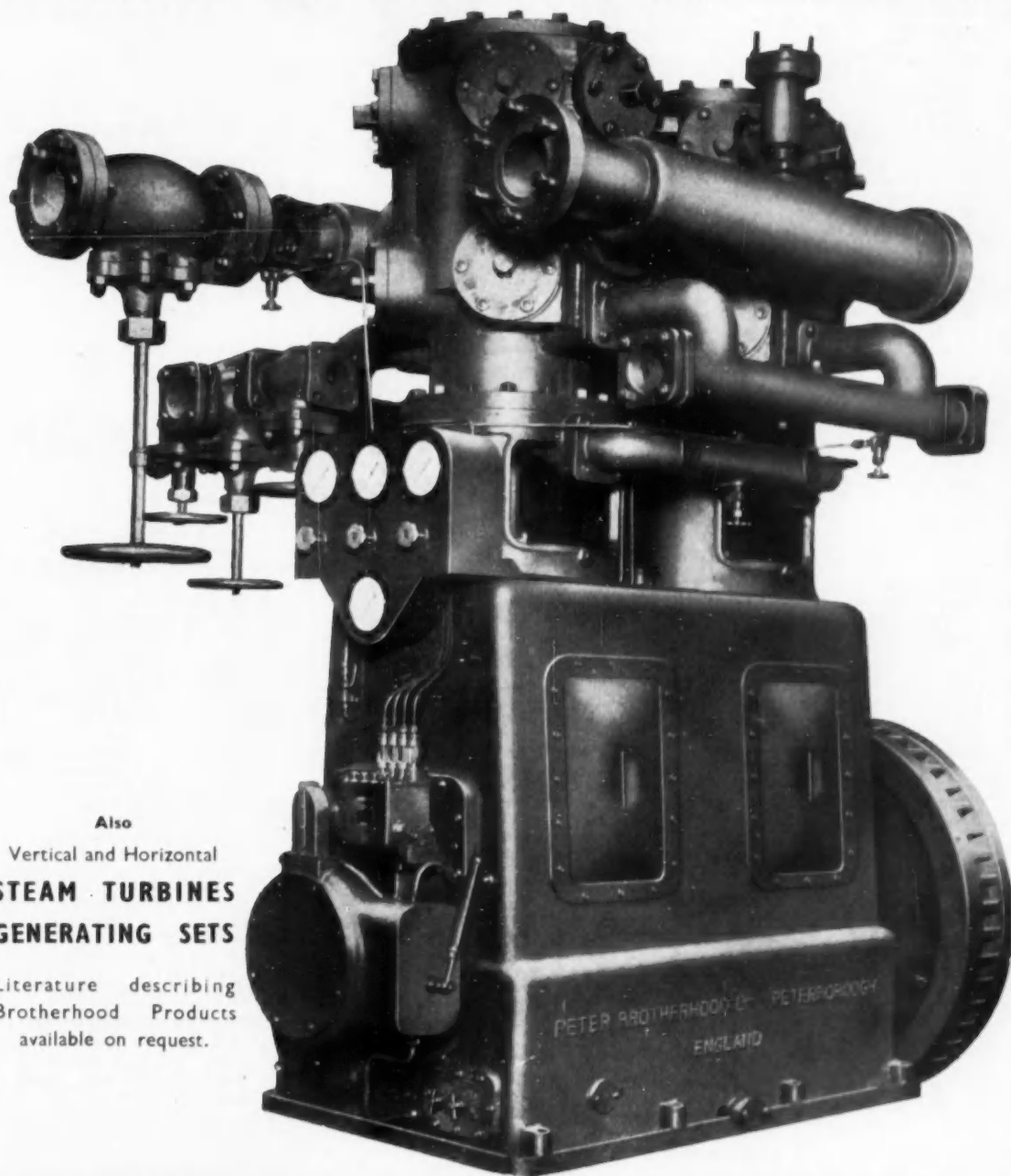
Grams : Bricavity, Parl, London

**ACID RESISTING
TILES · BRICKS
ACID TOWER
PACKINGS
RINGS AND BALLS**

Successfully used in

**GAILLARD TOWERS · ACID OIL
SETTLING TANKS · GAS WASHERS
CHIMNEY LININGS · ASH SLUICES
HYDROCHLORIC PICKLING TANKS
ETC.**

BROTHERHOOD Air, Gas and Refrigerating **Compressors**
For the manufacture of
ARTIFICIAL FERTILISERS and other **CHEMICALS**



Also

Vertical and Horizontal
STEAM TURBINES
GENERATING SETS

Literature describing
Brotherhood Products
available on request.



PETER

BROTHERHOOD LTD

PETERBOROUGH · ENGLAND

COMPRESSOR & POWER PLANT SPECIALISTS FOR NEARLY A CENTURY

INDEX TO ADVERTISERS

The first figures refer to advertisement in *The Chemical Age Year Book*, the second to the current issue

Page		Page		Page		Page	
283	A.P.V. Co., Ltd., The	—	239	British Lead Mills Ltd.	—	248	Douglas, William, & Sons Ltd.
216	Acalor (1948) Ltd.	—	Spine	British Resin Products Ltd.	—	250	Dowling Lime & Stone Co., Ltd., The
277	Accrington Brick & Tile Co., Ltd., The	—	372	British Railway Traffic & Electric Co., Ltd.	—	—	Dring & Fage Ltd.
229	Adequate Weighers Ltd.	—	256	British Rototherm Co. Ltd. The	—	258	Drummond Patents Ltd.
270	Aimer Products Ltd.	—	166	British Steam Specialties Ltd.	—	257	Dryden, T., Ltd.
158	Albany Engineering Co. Ltd. The	—	236	British Tar Products Ltd.	—	280	E.C.D., Ltd.
294	Alcock (Peroxy) Ltd.	—	—	British Thomson-Houston Co. Ltd.	—	—	Edison Swan Electric Co., Ltd.
—	Alexander, Herbert, & Co., Ltd.	422	—	—	—	—	Electronic Switchgear (London) Ltd.
—	Alginat Industries Ltd.	422	292	British Titan Products Co., Ltd.	—	259	Electrothermal Engineering Ltd.
178	Allen, Edgar, & Co., Ltd.	—	180	Broadbent, Thomas, & Sons, Ltd.	—	B/Mk.	Elliott, H. J., Ltd.
370	Alumina Co., Ltd., The	424	191	Brooks & Walker Ltd.	—	211	Elliott Brothers (London) Ltd.
366	Amalgamated Oxides (1939) Ltd.	—	209	Brotherhood, Peter, Ltd.	417	230	English Glass Co., Ltd., The
186	Angel, H. Reeve, & Co., Ltd.	—	232	Brotherton & Co., Ltd.	—	G/Cd.	Erinoid Ltd.
—	Armour & Co., Ltd.	—	—	Brough, E. A., & Co., Ltd.	—	296	Evered & Co., Ltd.
G/Cd.	Ashmore, Benson, Pease & Co.	—	214	Browns Foundry Co., Ltd.	—	—	Ewart, M. D., & Co., Ltd.
289	Ashworth, Arthur, Ltd.	—	260	Brush Design Group, The	—	288	Farnell Carbons Ltd.
—	Associated Lead Mfrs. Ltd.	—	274	Bryan Donkin Co., Ltd., The	—	—	Fawcett Finney Ltd.
386	Audley Engineering Co., Ltd.	—	290	Buell (1952) Ltd.	—	228	Feltham, Walter H., & Son Ltd.
146	Autometric Pumps Ltd.	—	273	Burnett & Rolfe Ltd.	—	230	Ferris, J. & E., Ltd.
190	B. A. Holland Engineering Co., Ltd., The	—	—	Bush, W. J., & Co., Ltd.	427	264	Film Cooling Towers (1925) Ltd.
—	B X. Plastics Ltd.	—	—	Butterworths Scientific Publications	—	211	Fisher Governor & Co., Ltd.
295	Baird & Tatlock (London) Ltd.	—	213	Butterfield, W. P., Ltd.	—	159	Foster Instrument Co., Ltd.
171	Baker Perkins Ltd.	—	—	Calder Vale Glassworks Ltd.	418	227	Foxboro-Yoxall Ltd.
350	Baker Platinum Division, Engelhard Industries Ltd.	—	—	Callow, F. E. (Engineers) Ltd.	—	—	Fraser, W. J., & Co., Ltd.
225	Balfour, Henry, & Co.	—	364	Candy Filter Co., Ltd., The	—	314	Fuller's Earth Union Ltd., The
222	Barclay Kellett & Co., Ltd.	—	264	Carbon Dioxide Co., The	—	182	Gallenkamp, A., & Co., Ltd.
215	Bennett, Sons & Shears Ltd.	—	—	Carmichael, John F., Ltd.	—	—	Geigy Co., Ltd., The
G/Cd.	Berk, F. W., & Co., Ltd.	—	—	Cekop Trading Corporation	—	276	Geigy Pharmaceutical Co., Ltd.
282	Beryllium & Copper Alloys (Safety Tools) Ltd.	—	207	Chapman & Hall Ltd.	—	—	General Electric Co., Ltd.
263	Blundell & Crompton Ltd.	—	207	Chemical Workers' Union, The	—	243	Grazebrook, M. & W., Ltd.
148	Borax Consolidated Ltd.	—	—	Chemicals & Feeds Ltd.	—	226	Greeff, R. W., & Co., Ltd.
237	Borax & Chemicals Ltd.	—	354	Chemitrade Ltd.	—	222	Grindley & Co., Ltd.
237	Boulton, William, Ltd.	—	275	Chesterfield Tube Co., Ltd., The	—	226	Hackbridge & Hewitt Electric Co., Ltd.
236	Bowmans Chemicals Ltd.	—	297	Ciech Ltd.	419	240	Haller & Phillips Ltd.
290	Braby, Fredk., & Co., Ltd.	423	248	Cinema Television Ltd.	—	266	Hanovia Lamps
231	Bramig & Co., Ltd.	—	244	Clark, T. C., & Co., Ltd.	434	218	Harris (Lostock Gralam) Ltd.
252	Brannan, S., & Sons, Ltd.	—	173	Clayton Dyestuffs Co. Ltd. The	—	258	Haworth, F. (A.R.C.) Ltd.
211	Bristol's Instrument Co., Ltd.	—	176	Clayton, Son & Co., Ltd.	—	161	Hearson, Charles, & Co., Ltd.
—	British Acheson Electrodes Ltd.	—	—	Clydesdale Chemical Co. Ltd. The	439	220	Herbert, Alfred, Ltd.
232	British Arca Regulators Ltd.	—	183	Cole, R. H., & Co., Ltd.	—	—	Holmes, W. C., & Co., Ltd.
268	British Assoc. of Chemists The	—	238	Cole & Wilson Ltd.	432	194	Honeywell & Stein Ltd.
—	British Carbo Norit Union Ltd.	426	196	Collins Improved Firebars Ltd.	—	279	Hopkin & Williams Ltd.
—	British Ceca Co., Ltd., The	—	356	Comet Pump & Eng. Co. Ltd. The	—	4	Huntington, Heberlein & Co. Ltd.
292	British Chrome & Chemicals Ltd. (London)	438	—	Costain-John Brown Ltd.	429	—	I.C.I. Ltd. Alkali Silicate of Soda
254	British Chrome & Chemicals Ltd. (Lancs)	—	256	Crockatt, W., & Sons, Ltd.	—	—	I.C.I. Limited, Billingham
—	British Drug Houses Ltd., The	457	169	Cromil & Piercy Ltd.	cov. ii	—	I.C.I. Plastics—Darvic
—	British Electrical Development Association	—	328	Cruickshank, R., Ltd.	—	—	I.C.I. Plastics—Fluon.
8	British Geon Limited	—	250	Cyanamid Products Ltd.	—	—	I.C.I. (Paper Goods Mfng.)
234 & 235	British Industrial Solvents	—	254	Cyclops Engineering Co. Ltd. The	—	157	Imperial Chemical Industries Ltd.
—	British Laboratory Ware Association Ltd.	—	298	Cygnat Joinery Ltd.	—	—	Imperial Smelting Corporation (Sales) Ltd.
233	British Labour Pump Co., Ltd.	—	238	Danks of Netherton Ltd.	—	cov. iv	International Combustion Group
—	—	—	—	Davey, Paxman & Co., Ltd.	—	—	Interscience Publishers Ltd.
—	—	—	330	Dawson, McDonald & Dawson Ltd.	—	—	Isopad Ltd.
—	—	—	—	Derby Luminescents Ltd.	—	278	Jackson, Henry (Liverpool) Ltd.
—	—	—	177	Dia Chemieausrustungen	—	382	Jackson, J. G., & Crockatt Ltd.
—	—	—	—	Dorr-Oliver Co., Ltd.	—	—	—

(continued on page 420)

CALDER VALE GLASSWORKS LTD

Calder Vale Rd. • Wakefield • Yorks

TEL. WAKEFIELD 3857

• SPECIALISTS IN •

**Carboys • Demijohns
Winchesters**

KEEBUSH

Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

KESTNER'S

5 Grosvenor Gardens, London, S.W.1

"CIECH"

Foreign Trade Enterprise

Warsaw 10 12 Jasna St. Poland

Sole exporters of the following products

**COLOPHONY
ACTIVE CARBON
PAINTS AND
VARNISHES**



**LABORATORY
CHEMICALS
REAGENTS
PHARMACEUTICALS
OPIUM ALCALI**



**OIL & NITRO-OIL
ARTISTIC POSTER
PAINTS 'TEMPERA'**



**SALICYLATES
HORMONES-ACTH
and others
SULPHAMIDES etc.**

Catalogues & Offers on request

INDEX TO ADVERTISERS

The first figures refer to advertisement in The Chemical Age Year Book, the second to the current issue

Page		Page		Page		Page		Page	
185	Jenkins, Robert, & Co., Ltd.	—	260	Mirrlees Watson & Co. Ltd. The	—	247	Siebe, Gorman & Co., Ltd.	—	
187	Jenkinson, W. G., Ltd.	—	253	Mirvale Chemical Co., Ltd.	—	360	Sigmund Pumps Ltd.	—	
3	Jobling, James A., & Co., Ltd.	424	253	Mitchell, Cotts & Co., Ltd.	—	—	Simon, Richard, & Sons, Ltd.	—	
210	Johnson, G. T., & Co., Ltd.	—	—	Mond Nickel Co., Ltd., The	—	320	Southern Instruments Computer Division	—	
206	Johnsons of Hendon Ltd.	—	—	Monsanto Chemicals Ltd.	—	—	Soyozchimexport (Moscow)	—	
201	Jones, Tate & Co., Ltd.	—	—	Moore, W. & E., Ltd.	—	348	Spencer Chapman & Messel Ltd.	428	
216	K.D.G. Instruments Ltd.	—	196	Morgan Crucible Co., Ltd., The	—	280	Spesco (Developments) Ltd.	—	
266	K.W. Chemicals Ltd.	—	—	Moritz Chemical Engineering Co., Ltd.	—	404	Stabilag Co., Ltd., The	—	
2	Kaylene (Chemicals) Ltd.	—	252	Murphy, G. L., Ltd.	—	—	Stanton Instruments Ltd.	—	
284	Keith Blackman Ltd.	—	197	National Enamels Ltd.	—	208	Staveley Iron & Chemical Co. Ltd.	—	
403	Kernick & Son Ltd.	—	217	Neckar Water Softener Co. Ltd.	428	194	Steel, J. M., & Co., Ltd.	—	
—	Kestner Evaporator & Engineering Co., Ltd.	418	181	Nederlandsche Verkoopkantoor Voor Chemische Producten N.V.	421	—	Stockdale Engineering Co., Ltd.	—	
—	Key Engineering Co. Ltd. The	—	206	Nederlandse Emballage Onderneming Gebr. de Wilde N.V.	—	—	Stonehouse Paper & Bags Mills	—	
160	Kier, J. L., & Co., Ltd.	—	262	Negretti & Zambra Ltd.	433	—	Streamline Filters Ltd.	—	
288	Kingsley & Keith Ltd.	—	164 & 165	Newton Chambers & Co. Ltd.	—	245	Sturges, John & E., Ltd.	431	
267	Kleen-e-ze Brush Co., Ltd.	—	—	New Metals & Chemicals Ltd.	—	242	Sutcliffe Speakman & Co., Ltd.	—	
193 & 269	Klinger, Richard, Ltd.	—	271	Nicolson, W. B. (Scientific Instruments) Ltd.	—	174	Taylor Rustless Fittings Co. Ltd.	432	
202	Lankro Chemicals Ltd.	—	175	Nordac Ltd.	—	282	Tenaplas Sales Ltd.	—	
198	Laporte Chemicals Ltd.	—	299	North Thames Gas Board	—	324	Thermal Syndicate Ltd., The	—	
192	Lavino (London) Ltd.	—	204	Northern Malleable Foundry Co., Ltd., The	—	145	Thermix Industries Ltd.	—	
221	Leda Chemicals Ltd.	—	—	Northey Rotary Compressors Ltd.	—	—	Thomason, W., & Sons Ltd.	460	
—	Leeds & Bradford Boiler Co., Ltd., The	—	—	Northide Ltd.	—	—	Thompson, John (Dudley) Ltd.	—	
204	Leigh & Sons Metal Works Ltd.	—	306	Palfrey, William, Ltd.	—	—	Thorium Ltd.	434	
—	Leitch, John W., & Co., Ltd.	—	—	Paper Goods Manufacturing Co., Ltd.	—	—	Todd Bros. (St. Helens & Widnes) Ltd.	—	
—	Lennig, Charles, & Co. (Great Britain) Ltd.	—	—	Pascall Engineering Co. Ltd. The	424	219	Towers, J. W., & Co., Ltd.	—	
—	Lennox Foundry Co., Ltd.	426	6	Paterson Engineering Co. Ltd. The	—	191	Trent Valve Co., Ltd.	—	
—	Ley, M.	—	203	Peabody Ltd.	—	286	Tungstone Products Ltd.	—	
376	Light, L., & Co., Ltd.	—	—	Penhryn Quarries Ltd.	—	—	United Coke & Chemicals Co. Ltd.	—	
—	Lind, Peter, & Co., Ltd.	—	310 & 338	Permutit Co., Ltd., The	—	172	United Filters & Engineering Ltd.	—	
—	Cover London Aluminium Co. Ltd. The	—	—	Petrocarbon Developments Ltd.	436	244	W.E.X. Traders Ltd.	—	
300	London Metal Warehouses Ltd.	—	—	Pott, Cassels & Williamson Ltd.	—	291	Walker Extract & Chemical Co. Ltd.	—	
—	Longmans Green & Co., Ltd.	—	334	Powell Duffryn Carbon Products Ltd.	430	—	Wallach Bros. Ltd.	—	
284	Lord, John L., & Son	—	—	G/Cd. Power-Gas Corporation, Ltd. The	—	184	Waller, George, & Son Ltd.	—	
—	Machinery (Continental) Ltd.	—	259	Press at Coombelands, Ltd., The	—	246	Walley, A. L.	—	
—	MacLellan, George, & Co., Ltd.	—	170	Price Stutfield & Co., Ltd.	—	190	Wallis, Charles, & Sons (Sacks) Ltd.	—	
199	Mallinson & Eckersley Ltd.	—	320	Prodorite Ltd.	—	—	Ward, Thos. W., Ltd.	435	
—	Manesty Machines	—	—	Pyrethrum Board of Kenya Q.V.F. Ltd.	—	200	Watford Chemical Co., Ltd.	—	
380	Marchon Products Ltd.	—	287	Reads Ltd.	—	188	Watson, Laidlaw & Co., Ltd.	—	
263	Marco Conveyor & Eng. Co. Ltd.	—	—	Richmond Welding Co., Ltd.	—	344	Webb, William A., Ltd.	—	
192	Matthews & Yates Ltd.	—	—	Robinson, F., & Co., Ltd.	—	—	Weinreb & Randall Ltd.	—	
—	May & Baker Ltd.	—	—	G/Cd. Rose, Downs & Thompson Ltd.	—	195	Wells, A. C., & Co., Ltd.	—	
162	Measuring & Scientific Equipment Ltd.	—	208	Rotometer Manufacturing Co. Ltd.	—	224	Wengers Ltd.	—	
330	Meigh Castings Ltd.	—	362	St. Helens Cable & Rubber Co. Ltd.	—	218	Whitaker, B., & Sons Ltd.	cov. ii	
168	Metal Box Co., Ltd., The	—	249	Sandiacre Screw Co., Ltd., The	—	285	Widnes Foundry & Engineering Co., Ltd.	—	
—	Cover Metal Containers Ltd. front cover	—	210	Scientific Glass-Blowing Co. The	—	241	Wilkinson Rubber Linatex Ltd.	—	
—	Metalfiltration Co., Ltd., The	—	—	Shaw Petrie Ltd.	cov. iii	223	Willcox, W. H., & Co., Ltd.	—	
G/Cd.	Metallcock (Britain) Ltd.	—	286	Shawinigan Ltd.	—	214	Wilson, Edward, & Son Ltd.	—	
228	Metcalf & Co.	—	340	Shell Chemical Co., Ltd.	—	189	Winn & Coates Ltd.	—	
—	Metropolitan - Vickers Electrical Co., Ltd.	—	—	—	—	212	Wood, Harold, & Sons Ltd.	—	
198	Middleton & Co., Ltd.	—	—	—	—	246	Worcester Royal Porcelain Co., Ltd., The	434	
—	Mills Packard Construction Co. Ltd.	—	—	—	—	—	Worthington-Simpson Ltd.	425	
261	Mine Safety Appliances Co. Ltd.	—	—	—	—	179	Wynn (Valves) Ltd.	—	
—	—	—	—	—	—	251	Yorkshire Tar Distillers Ltd.	—	
—	—	—	—	—	—	240	Zeal, G. H., Ltd.	—	

The Classification of Fire Hazards and Extinction Methods

By JAMES D. BIRCHALL

8s. 3d. [postage paid]

NEW FIRE HAZARDS are increasing with the rapid expansion of certain chemical industries, notably in the field of plastics. The nature of these hazards has been explored in this book, which gives classified lists of substances and extinction agents, and detailed analyses and conclusions based on these tables. This information about chemicals, plastics, dust, and liquids is of the utmost use in every industry where new risks are attendant on the employment of new materials.

Published by **ERNEST BENN LIMITED**

Bouverie House • Fleet Street • London • EC4



**Sales office
of 8 leading
Dutch chemical
industries**

Export - Import - Transit

**Nederlandsch Verkoopkantoor
voor Chemische Producten N.V.**

Amino acetic acid (glycine)

Ammonia water
Anhydrous liquid ammonia
Benzol/benzene

Caprolactam

Copperoxychloride 56/58%

Cyclohexanol

Cyclohexanone

Ether, technical and pure
Hydrochloric acid, technically
and chemically pure

Koneprox (copperoxychloride-
fungicide)

Manganese dioxyde

Manganese ore

Monochloro acetic acid

Nitric acid 53% and 60%

Nitrilo tri acetic acid

Pyridine

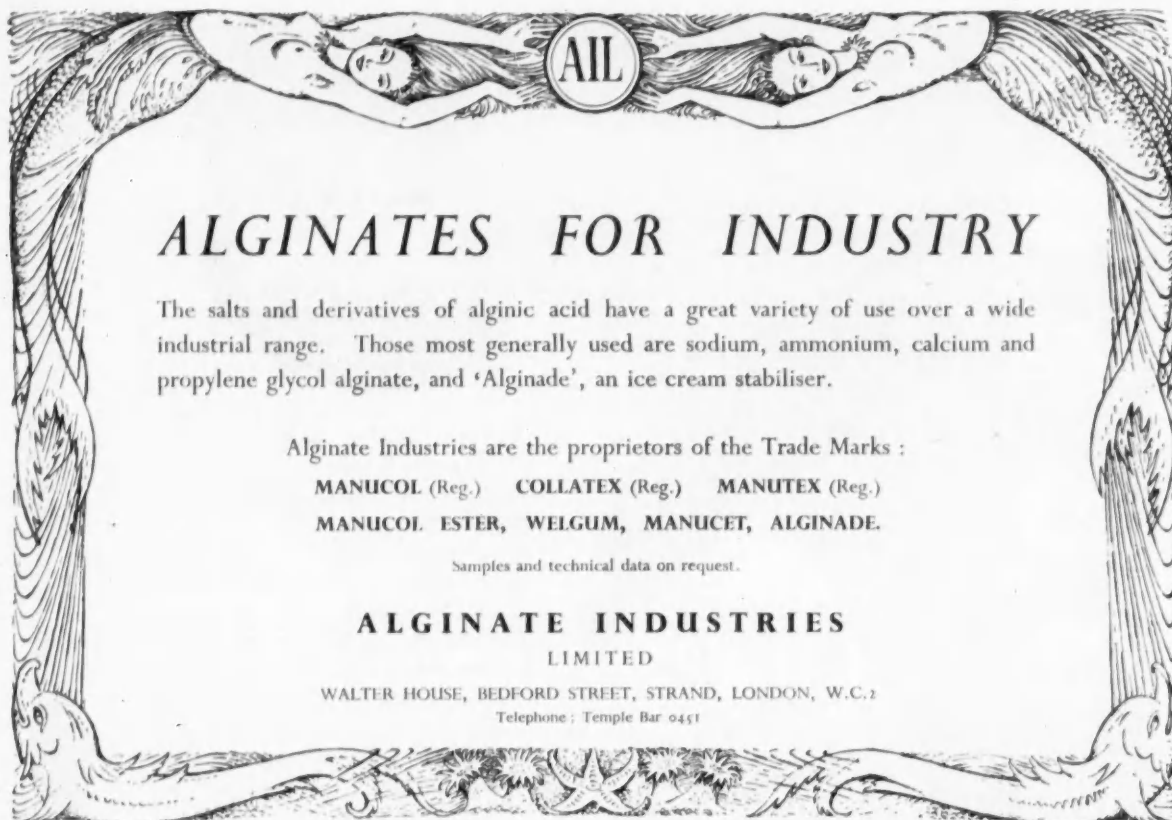
Sodium chloroacetate

63 Mauritskade
Amsterdam-Holland
Postbox 4038
Telephone 54322
Telegrams: Chemicals
Telex 12270

LONDON OFFICE:

GREYER, BRECHEISEN & CO., LTD.

BUSH LANE HOUSE, CANNON STREET, LONDON, E.C.4.



ALGINATES FOR INDUSTRY

The salts and derivatives of alginic acid have a great variety of use over a wide industrial range. Those most generally used are sodium, ammonium, calcium and propylene glycol alginate, and 'Alginade', an ice cream stabiliser.

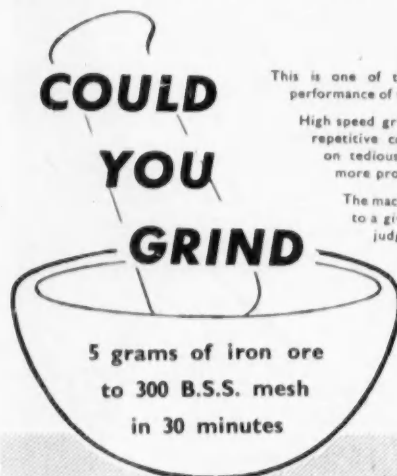
Alginate Industries are the proprietors of the Trade Marks :

MANUCOL (Reg.) COLLATEX (Reg.) MANUTEX (Reg.)
MANUCOL ESTER, WELGUM, MANUCET, ALGINADE.

Samples and technical data on request.

ALGINATE INDUSTRIES LIMITED

WALTER HOUSE, BEDFORD STREET, STRAND, LONDON, W.C.2
 Telephone: Temple Bar 0451



This is one of the many examples of the high performance of which this new machine is capable.

High speed grinding is particularly desirable for repetitive control sampling. Staff employed on tedious hand grinding are released to do more profitable work.

The machine will grind samples consistently to a given mesh size relying less upon the judgment and perseverance of the assistant.

Standard grinding members are of agate and ensure complete freedom from metallic contamination.



IF NOT — YOU NEED AN
ALEXANDER **Electrical**
 Pestle and Mortar

A Midlands
works laboratory
saves an average of
25 hours a week

USED AS A MIXER

By substituting a stirrer and bowl for the pestle and mortar units, the machine is converted to a simple mixer in a matter of seconds.

Send a sample for test

HERBERT ALEXANDER & CO. LTD.
Hercules Engineering Works
Charmouth Street LEEDS 11

Phone: 20655 Grams & Cables: Alexson, Leeds 11

BRABY (regd.) STEEL DRUMS



expendable
(single journey)



returnable

These drums are available in a wide range of types in Returnable and Non-Returnable forms. All types can be supplied with painted exteriors whilst some may be decorated in colour suitable for the application of Users' names, trade marks, etc. Other finishes include galvanized, tin or lacquer lined.

ONE OF THE WIDE RANGE OF

BRABY

PRODUCTS

FREDERICK BRABY & COMPANY LIMITED

HAVELOCK WORKS, AINTREE, LIVERPOOL, 10. TELEPHONE: AINTREE 1721

OTHER FACTORIES AT: London Works, Thames Road, Crayford, Kent. TELEPHONE: Besleyheath 7777
Eclipse Works, Petershill Road, Glasgow, N. TELEPHONE: Springburn 5151
Ashton Gate Works, Bristol, 3. TELEPHONE: 64041. And Falkirk

OTHER OFFICES: 352-364 Easton Road, London, N.W.1 (Head Office). TELEPHONE: EUSTON 3456
110 Cannon Street, London, E.C.4 (Export). TELEPHONE: MANsion House 6034
Queen's Buildings, 10 Royal Avenue, Belfast. TELEPHONE: 26509
Palace Street, Plymouth. TELEPHONE: 62261



'PYREX' 'Grip-Seal' Joints simplify apparatus assembly ... are 100 per cent effective

The perfect-fitting qualities of 'Grip-Seal' Joints are due to the unique 'PYREX' method of manufacture, which ensures that every joint, both male and female, is ground and tested with micrometric precision.

Further, 'Grip-Seal' design results in stronger joints, with sturdier walls, more robust beadings, and sensible parallel gripping surfaces.

The logical result is, of course, that apparatus assembly is simplified, because every joint fits closely and securely, while the clamps hold the apparatus in a firm, safe grip.

Breakages in assembling and dismantling seldom occur, and expensive apparatus is thus safeguarded to give longer service.

That's typically 'PYREX' of course ... one hundred per cent satisfaction.

- A special section of the 'PYREX' catalogue deals with 'Grip-Seal' apparatus. If you would like a copy, please send your name, address and position in firm or organisation.



'PYREX'

REGD. TRADE MARK


THE BRITISH
LABORATORY GLASSWARE

JAMES A JOBLING & CO LTD

Wear Glass Works Sunderland

THE ONLY MAKERS OF 'PYREX' BRAND GLASS IN THE UNITED KINGDOM

high speed grinding & blending

Pinned disc mills are unsurpassed for high speed particle size reduction at an economic cost of any material that disintegrates under impact. The industrial applications cover a wide field such as processing chemicals, colours, cosmetics, dyestuffs, foodstuffs, synthetic resins, etc.

One of the many good features of Pascall pinned disc mills is that the mill will blend roughly mixed materials or colours and the resultant product is not just a good mixing but an absolute homogeneous blend with the various items thoroughly dispersed or free from colour streaks. Dustless in operation, the Pascall pinned disc mill is ideal for handling noxious and dangerous materials with safety and convenience.

Other features are the economical operational costs, the ease of installation, cleaning and maintenance. Available in various sizes for dealing with outputs from lbs. to tons per hour.



PASCALL

Write or telephone
Crawley 25166 for
List PM 901

THE PASCALL ENGINEERING CO. LTD.
GATWICK ROAD · CRAWLEY · SUSSEX



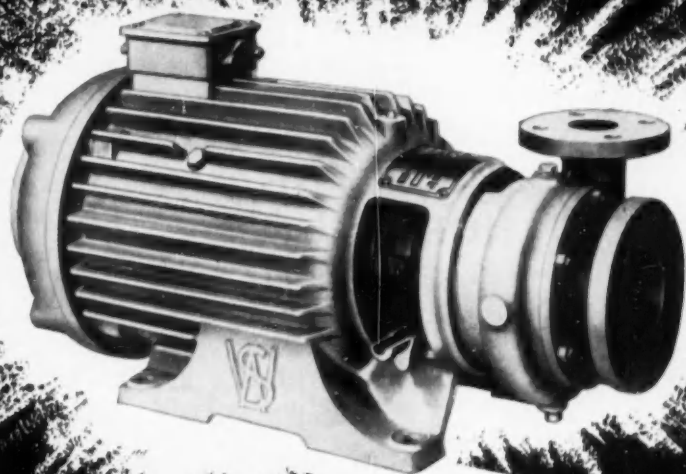
If you have an EFFLUENT or SEWAGE TREATMENT problem we can be of assistance

We are Manufacturers of ALUMINIUM SULPHATE—the use of which is frequently an essential step in the process of producing a satisfactory liquid effluent.

May we examine your present effluent and offer our advice?

THE **ALUMINA** CO. LTD.
IRON BRIDGE WORKS
WIDNES. LANCs.

PHONE
WIDNES
2275



put it to the test!

These new pumps open up an extensive range of acids, alkalis and slurries to economical pumping. They are constructed in 18/8/3 Stainless Steel for mildly corrosive liquids or in WORTHITE, a super-resistance alloy steel enabling Sulphuric Acid to be pumped with negligible corrosion loss. Also, there is the added advantage of easy interchangeability of the Stuffing Box Packing with two types of Mechanical Seal to suit different processes — plus the embodiment of the well-known Worthington-Simpson "Monobloc" construction which means few parts, lower costs, less wear and easier installation.

MONOBLOC CONSTRUCTION

with all affected parts in

18/8/3

STAINLESS STEEL

for mildly corrosive liquids
or where contamination and
discolouration of the liquid
must be avoided

WRITE FOR SPECIMEN
1½" DISCS AND TEST
THESE MATERIALS
UNDER YOUR OWN
SITE CONDITIONS

ALSO AVAILABLE IN 'WORTHITE'

a new alloy steel with exceptional resistance
to many acids, alkalis and slurries



WORTHINGTON - SIMPSON

CHEMICAL PUMPS

A WIDE RANGE AVAILABLE

WORTHINGTON-SIMPSON LIMITED NEWARK NOTTS

ULTRASORB ACTIVATED CARBON

ULTRASORB carbons are available for recovery of most industrial solvents, benzole extraction, water purification and other gas and liquid phase applications

BRITISH

CARBO NORIT UNION LIMITED

LONDON ROAD . WEST THURROCK . ESSEX

Telegrams: 'BRICARBUN GRAYS.'

Telephone: GRAYS THURROCK 4845

CARBO - UNION - WHESOE

Activated Carbon Recovery Plant for the purification of gases and the recovery of vapour phase solvents

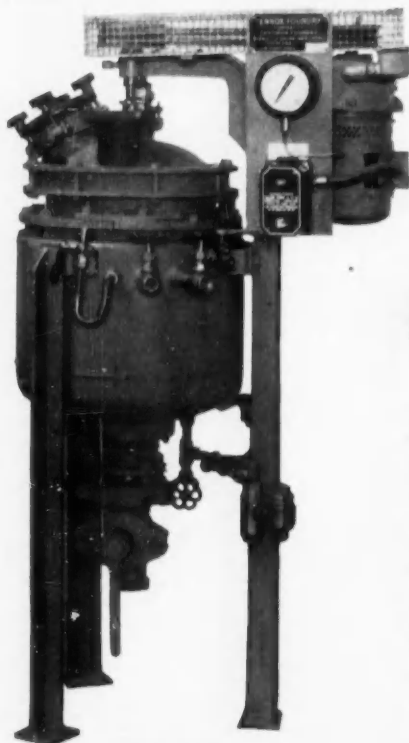
Whessoe Ltd • Darlington • Co. Durham

Cables: Whessoe Darlington

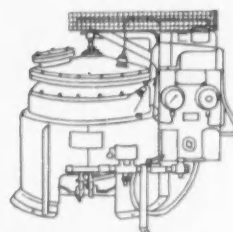
Telephone: Darlington 5315

LONDON OFFICE: 25 VICTORIA STREET, S.W.1.

ABBEY 3881



steam or oil jacketed



AUTOCLAVES

The Lennox Foundry Company are specialists in the supply of materials of construction for resisting corrosion and in the manufacture of process plant for specialised applications. In most cases we can supply plant designed for particular working conditions, constructed of the most suitable materials for these requirements, and, if necessary, we can build pilot plant for developing new processes. Our technical staff are always at your service to give advice.

**IN TANTIRON AND
HOMOGENEOUSLY
LEAD LINED STEEL**

by



LENNOX FOUNDRY CO. LTD.

Tantiron Foundry, Glenville Grove, London, S.E.8

BENZOIC ACID
BENZYL ANILINE
BENZYL ALCOHOL
BENZYL CHLORIDE
BENZYL CYANIDE

When it comes
to 'know-how'

we
also
are proud
of our skill...

BUSH

FINE CHEMICAL MANUFACTURERS

W. J. BUSH & CO. LTD. LONDON · E 8 · ENGLAND



ACIDS



*Scientifically prepared for
TRANSPORT ANYWHERE*



**OLEUM
SULPHURIC
BATTERY
HYDROCHLORIC
NITRIC
DIPPING ACID
DISTILLED WATER (PURE)**

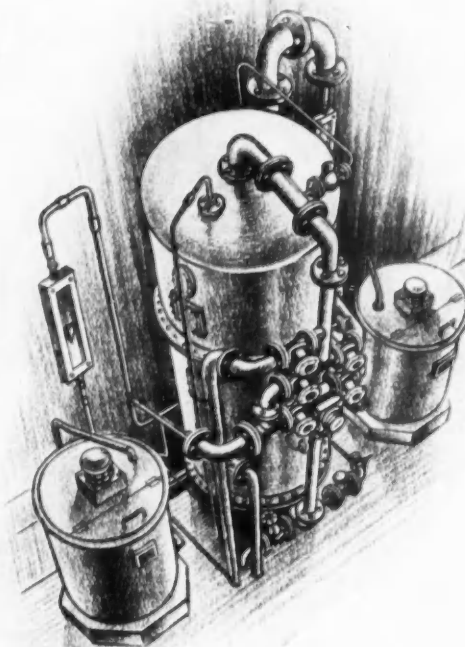
*supplied in any quantity
and package*

**SPENCER CHAPMAN
& MESSEL LIMITED**

45 · PARK LANE · LONDON W.1.

Telephone: GROsvenor 4311 (4 lines)
WORKS · SILVERTOWN · E.16

Ion exchange



**ion exchange is the answer
to all requirements for
water of distilled quality**

*Typical plants employing various methods . . . fully
described in our literature available on request*

NECKAR

NECKAR WATER SOFTENER CO. LTD.

Artillery Row, London, S.W.1



The keys to

Chemical Engineering



COSTAIN - JOHN BROWN
LIMITED

CJB chemical engineering service has proved itself so often to be the key to a particular problem, because it offers a flexible plan tailored to suit a clients requirements.

It can embrace a single unit of plant such as a distillation column or a whole scheme from the flow diagram to the commissioned plant, or a "study and report" request similar to that currently in hand for the Indian Government Heavy Water projects.

A fuller assessment of this valuable technical service is easily arranged...
phone Fulham 7761.

CHEMICAL ENGINEERING DIVISION

ROXBY PLACE

LONDON S.W.6.

Heat exchanger standardisation

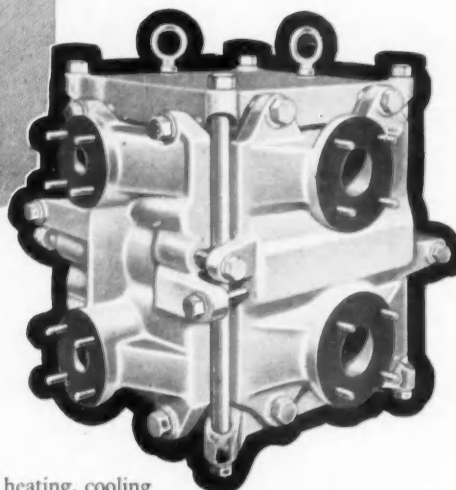
**Can your heat exchangers be readily
converted from one duty to another?**

Unsuitably spaced shell baffles, limited pass arrangements, corrosion, space requirements etc. all seriously restrict the flexibility of tube and shell heat exchangers.

Consider the advantages of the graphite block heat exchanger from this point of view:

- ★ Standard sub-assembly, corrosion proof on both sides and suitable for heating, cooling and condensing most fluids and vapours, using steam, water or brine on either side.
- ★ Pass arrangements varying from 1 to 16 are obtainable on either or both sides merely by substitution of headers.
- ★ Exceptionally compact, can be installed in very confined space and requires no special supporting structure. Easily cleaned *in situ* either chemically or by brushing.

POWELL DUFFRYN CARBON PRODUCTS LTD.



Springfield Road,
Hayes, Middlesex
Phone: Hayes 3994-8

ACTIBON

*. . . the highly activated
Carbon for ALL
Decolourising purposes*

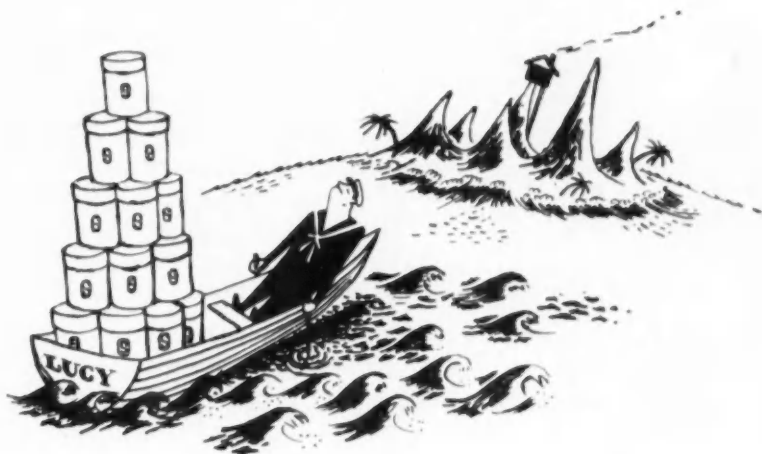
THE CLYDESDALE CHEMICAL CO. LTD.

142 QUEEN STREET · GLASGOW C.1

Phone: CENTral 5247/8

Grams: "Cactus" Glasgow

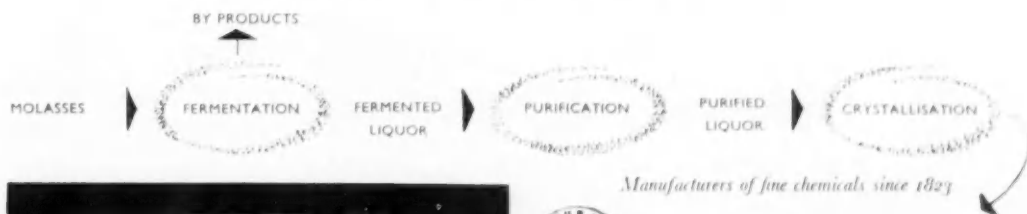
FINE CITRIC ACID IN THE MAKING



Going out into the world

A mention of "going out into the world" had a remarkable effect upon our new artist — we may not have to fire him after all! Making allowance for artistic licence, he grasped more or less what we were driving at right away.

Sealed in airtight packs, proof against damp and contamination, Sturge citric acid is despatched to customers all over the world. The wide variety of purposes for which it is used is a tribute to its outstanding quality and purity. These uses include pharmaceutical and medicinal preparations, fruit squashes and carbonated beverages, sugar confectionery, jams and preserves, baby foods, ice cream and processed cheeses as well as in resins, plasticisers, paints, inks, photography, dyeing, calico printing and electroplating.



STURGE



Manufacturers of fine chemicals since 1823

CITRIC ACID BP

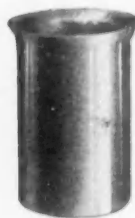
CITRIC ACID ANHYDROUS

JOHN & E. STURGE LTD • WHEELYS ROAD • BIRMINGHAM, 15 • TEL: MIDLAND 1236

754 C.A. 6



Stainless Steel Plant and Holloware



We are manufacturers of a wide range of holloware in stainless steel which finds use, because of its resistance to many forms of chemical attack, in dye works, chemical factories, food factories, laboratories and, because of its inherent cleanliness, in hospitals.

We are also plant manufacturers in stainless steel, and will be pleased to have your enquiries for any stainless steel equipment. We are able to fabricate vessels for light, medium and severe duty as laid down in BS. 1500.

Ask for our leaflets.

The Taylor Rustless Fittings Co. Ltd.

Leeds 638711/2
Abbey 1575

Head Office:—Ring Road, Lower Wortley, Leeds, 12
London Office:—14, Great Peter Street, London, S.W.1

YORKSHIRE MINED

BARYTES
BARIUM SULPHATE 98-99%

FLUORSPAR
ACID GRADE
CALCIUM FLUORIDE 98-99%

HIGH GRADE QUALITIES

PRICES AND SAMPLES ON APPLICATION

Produced by:—
DALES CHEMICALS LTD
GRASSINGTON, YORKS

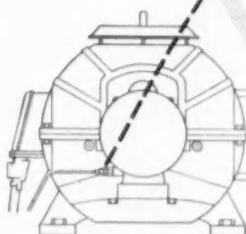
SOLE SELLING AGENTS

COLE & WILSON LTD

24 GREENHEAD ROAD, HUDDERSFIELD
Telephone HUDDERSFIELD 1993
WORKS—Common Road

TELEGRAMS COLOUR HUDD.
Bay Hall Birkby Huddersfield
Telephone Huddersfield 2499

Fair Warning!



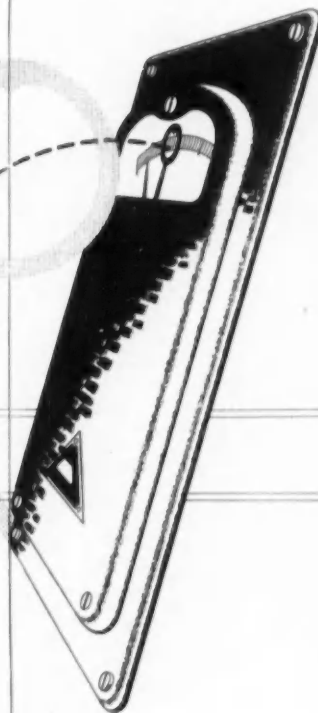
** A typical application, many of which have been supplied*



by Negretti & Zambra
Dial Thermostats

*Motors driving essential fans are connected by mercury in steel temperature systems to N & Z Dial Thermostats on a central instrument panel. If a tendency towards overheated bearings develops, a light on the panel indicates the motor or fan concerned and an audible warning is given. This may be cancelled but the light remains until normal conditions are restored, when the alarm circuit is reset.

Safeguard your plant and/or process by installing Negretti & Zambra instruments.



NEGRETTI & ZAMBRA



Manufacturers of instruments for the indication, recording, controlling of : Temperature, pressure, liquid level, volume, specific gravity, humidity, etc.

NEGRETTI & ZAMBRA LTD • 122 REGENT STREET • W.1

GLASS ENAMEL LINED CHEMICAL PLANT



A Complete Plant
or a Single unit

T. & C. CLARK & CO. LTD.
WOLVERHAMPTON

Grams: Clark, Wolverhampton.

Tel: 20204/5

FILTER • CRUCIBLES • of Porous • Porcelain

• retain the finest precipitates and
• filter rapidly. They are not
• affected by acids, remain con-
• stant in weight within very fine
• limits and can be heated to high
temperatures.

Made by

The **WORCESTER**
ROYAL PORCELAIN CO.
LIMITED

Supplied by all recognised Laboratory Furnishers.



FABRICATED EQUIPMENT



by
WIDNES

ILLUSTRATED: Mild Steel Jacketed Oxidiser—
4ft. 8½" dia. x 8ft. 6" long inside, arranged for
motor driven agitator and fitted with cooling fan

In the making of plant and equipment
in cast iron and fabricated steel, Widnes
Foundry and Engineering Co. Ltd. have
served industry for over a hundred years.

Established 1841

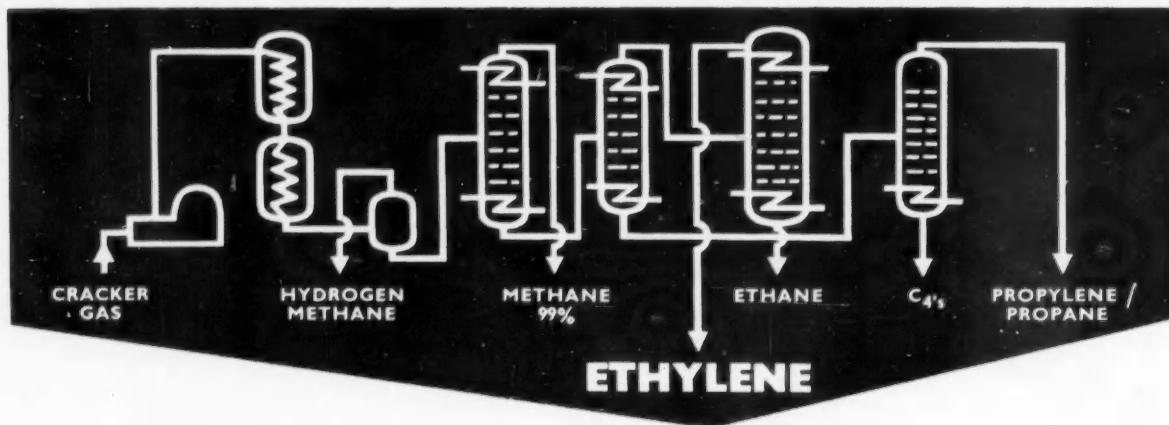
WFE

**WIDNES FOUNDRY
& ENGINEERING CO LTD**

LUGSDALE ROAD · WIDNES · LANCs

TELEPHONE: WIDNES 2251/4 · TELEGRAMS: "FOUNDRY · WIDNES

W/35

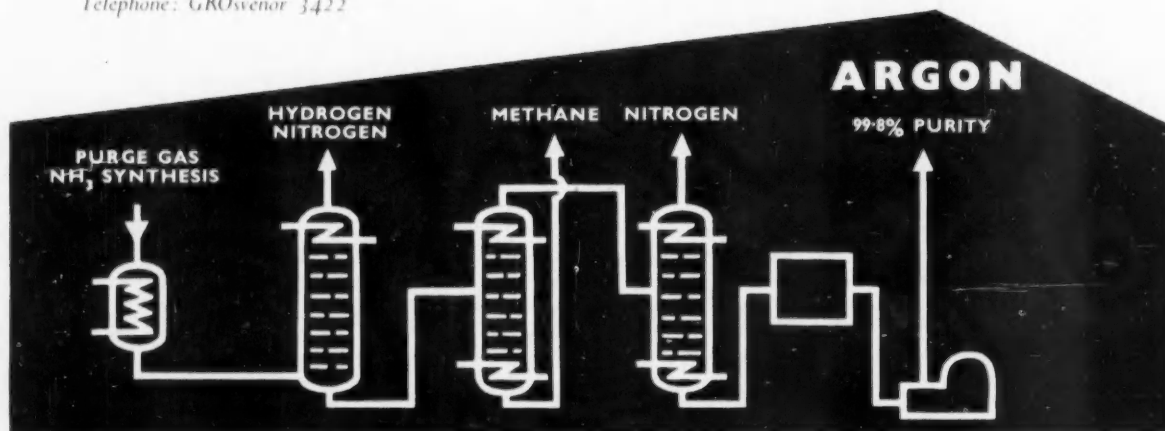


for gas separation and
low temperature installations

PETROCARBON DEVELOPMENTS LTD.

17 STRATTON STREET, PICCADILLY, LONDON, W.1.

Telephone: GROsvenor 3422



VOL. LXXVI No. 1953

15 DECEMBER 1956

The international weekly
chemical journal covering every
aspect of industrial chemistry
and chemical engineering

THE CHEMICAL AGE

OVERSEAS AGENTS

Argentina, Inter-Prensa, Florida 229, Buenos Aires • **Australia**, L. M. Cullen & Co. Pty. Ltd., 12 Howard Street, Perth. Gordon & Gotch (Australasia) Ltd., 262-264 Adelaide Street, Brisbane, Queensland. The Grahame Book Co., 39-49 Martin Place, Sydney, N.S.W. John Hinto & Co., 164 Pitt Street, Sydney, N.S.W. Jervis Manton Pty. Ltd., 190 Bourke Street, Melbourne C.I. N.S.W. Bookstall Co. Pty. Ltd., Cnr. Market & Castlereagh Streets, Sydney, N.S.W. • **Belgium**, W. H. Smith & Son Ltd., 71-75 Boulevard Adolphe Max, Brussels • **Brazil**, Livraria Stark Ltda., Caixa Postal 2786, Sao Paulo • **British West Indies**, Christopher B. Hills, 101-103 Harbour Street, Kingston, Jamaica • **Canada**, W. H. Smith & Son (Canada) Ltd., 224 Yonge Street, Toronto • **Ceylon**, The City Stores Ltd., Kandy. The Lake House Bookshop, McCallum Road 10, Colombo • **Chile**, The E. S. Blair Company, Bandera 172-80 Piso Of. 14, Santiago, Chile • **Cyprus**, The Union Trading Co., P.O. Box 123, Larnaca • **Czechoslovakia**, Artia Ltd., 30 Ve Smeckach, Prague 11 • **Denmark**, Illustrated News Service, Dahlerupsgade 1, Copenhagen V • **Egypt**, S. S. Bassous, P.O. Box 109, Alexandria • **Finland**, Akateeminen Kirjakauppa, Helsinki. Rautatiekirjakauppa Oy, Helsinki • **Fiji**, A. A. Shamsen & Co., P.O. Box 8, Suva • **France**, Paul Crampel, 54 rue Rene Boulanger, Paris X • **Germany**, Buch und Zeitschriften-Union, Harvestehuder Weg 5, Hamburg 13. W. E. Saabach G.m.b.H., 30, Gertrudenstrasse, Cologne 1 • **Holland**, Dekker en Nordemann's Wetenschappelijke Boekhandel N.V., O.Z. Voorburgwal 243, Amsterdam C. Meulenhoff & Co., N.V., 2-4 Beulingstraat, Amsterdam • **Hong Kong**, F. E. Skinner (Hong Kong) Ltd., P.O. Box 1066, Hong Kong • **India**, Biver & Co., 11 Maharaja Tagore Road, Calcutta 31. J. M. Jaina & Bros., Mori Gate, Delhi. Manufacturers' Eastern Agency, P.O. Box 301, 105 Apollo St., Bombay. L. V. Parashah, 32 T.S.V. Kovil Street, Mylapore, Madras. 4 • **Indonesia**, Meulenhoff & Co., N.V., 2-4 Beulingstraat, Amsterdam, Holland • **Israel**, The Collective Subscription Agency, P.O. Box 768, Haifa • **Italy**, Intercontinental S.R.L., Via Edolo 27, Milan. Messagerie Italiana S.p.A., Via Lomazzo 52, Milan • **Japan**, Maruzen Co. Ltd., 6 Tori-Nichome, Nishinabashi, Tokyo. Overseas Publications, Ltd., Central P.O. Box 1582, Tokyo • **Malaya**, City Book Store Ltd., Winchester House, Collyer Quay, Singapore • **Malta**, Allied Malta Newspapers, Ltd., Strickland House, 341 St. Paul Street, Valetta. Lewis Gaudi, 71 St. Mary Street, Sliema • **Mauritius**, E. Dawood Ltd. P.O. Box 27, Port Louis • **Mexico**, The Crane Agency, Ave. 16 de Septiembre No. 4 Desp. 402, Mexico, D.F. • **New Zealand**, N. Hamilton Baker, G.P.O. Box 721, Wellington. R. Hill & Son, Ltd., Plaza Building, 236 Queen Street, Auckland C.I. • **Nigeria**, Goodwill Trading Co., Kemta-Okebode, Abeokuta • **Norway**, A/S Narveens Kioskkompani, Stortingsgata 2, Oslo • **Pakistan**, Danishmand & Co., Karkhana Bazar, Lyallpur, W. Punjab. Seafar Agencies, opp. Grindlays Bank Ltd., Bunder Road, Karachi 2 • **Paraguay**, Representaciones Reuter, Calle Palma 308, Asuncion • **Persia**, Vitab Commercial Establishment, 1856 Ave. Hafez, Tehran • **Rhodesia & Nyasaland**, Federation of V. W. Van Rijnberk, P.O. Box 238, Bulawayo, S. Rhodesia • **Salvador**, Antonio Garcia, 5a Calle Orient No. 75 San Salvador • **South Africa**, Technical Books (Pty.) Ltd., P.O. Box 2866, Cape Town • **Spain**, Distribuidora Internacional Soc. Ltda., Duque De Sexto, 36, Madrid • **Sweden**, Wannergren-Williams AB, Box 657, Stockholm • **Switzerland**, Dr. H. R. Conrad, Rehmat, Mailen, Nr. Zurich • **Syria**, F. H. Tcheleby, P.O. Box 225, Aleppo • **Turkey**, H. C. Hornstein, 1480 inci Sok. No. 12, Alsancak, Izmir • **U.S.A.**, British Publications Inc., 30 East 60th Street, New York 22 • **American News Co. Inc.**, 131 Varick Street, New York 13. Moore-Gottrill Subscription Agency, North Cohocton, New York • **Uruguay**, Libreria Iesa Ltda., Sarandi 530, Montevideo • **Venezuela**, Distribuidora Santiago C.A., Apartado 2589, Caracas.

NEWS of the WEEK

US Chemicals Abroad	439
Ramsay Dinner	440
Note & Comment	441
People in the News	442
Some Developments in Surochemistry	443
Nickel Developments & Price	444
Unilever NV Research	445
Production of Citric Acid by Fermentation	447
From all Quarters	449
Pharmacopœia for Food Products	450
Toxic Hazards in Industry—part 4	451
Commercial Intelligence	454
Market Reports	454
Patents	456

BOUVERIE HOUSE • FLEET STREET • LONDON • EC4

Editor

Telephone: FLEet Street 3212 (26 lines)

GEOFFREY F. D. PRATT

Telegrams: Allangas • Fleet • London

Director

N. B. LIVINGSTONE WALLACE

Manager

H. A. WILLMOTT

Midlands Office,

Daimler House,

Paradise Street,

Birmingham

(Midland 0784/5)

Scottish Office,

116 Hope Street,

Glasgow C2

(Central 3954/5)

Leeds Office,

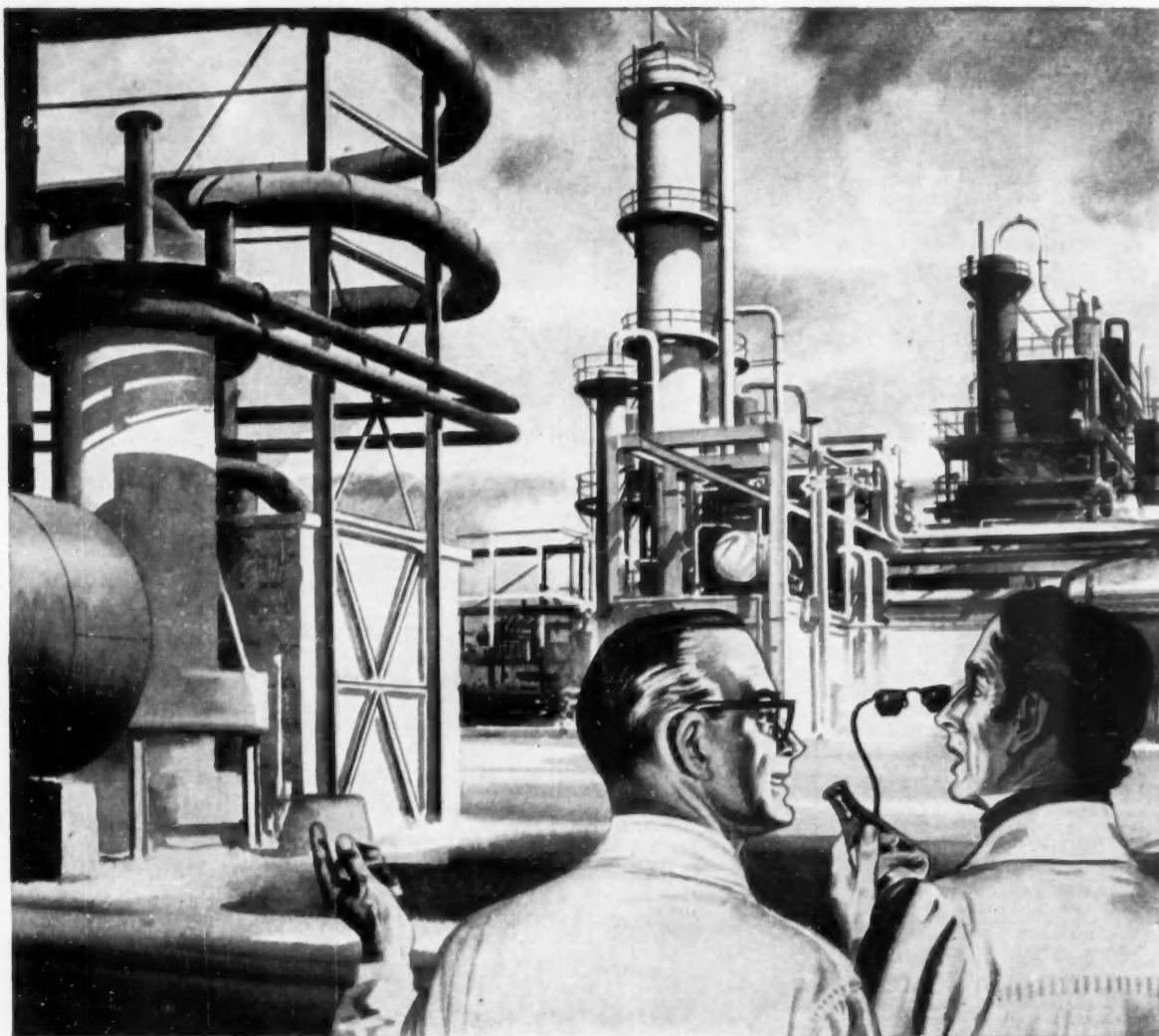
Martins Bank Chambers,

Park Row,

Leeds

(Leeds 22601)

The annual subscription is 52s 6d (\$7.40), single copies 1s 3d (by post 1s 6d). Overseas subscribers may send their subscriptions direct to London, or remit through any of our agents.



130 YEARS OF EXPERIENCE...

... lies behind the Chromium chemicals manufactured by B.C.C. The range of application of Chromium chemicals has considerably widened through the years. The Chemical Industry has become a major contribution to industrial progress, behind which lies the continued availability of B.C.C. Chromium chemicals made to the highest standards of purity.

The improvement of existing products and the development of new applications utilising Chromium's inherent properties is the constant aim of the research teams of B.C.C.



Britain's largest manufacturer of chrome chemicals

SODIUM BICHROMATE • ANHYDROUS SODIUM BICHROMATE • POTASSIUM BICHROMATE • AMMONIUM BICHROMATE
SODIUM CHROMATE • POTASSIUM CHROMATE • CHROMIUM SULPHATE • CHROMIUM OXIDE • CHROMIC ACID
The experience of B.C.C. is at the service of the Chemical Industry.

BRITISH CHROME & CHEMICALS LIMITED, EAGLESCLIFFE, STOCKTON-ON-TEES.

Please write to:—

SALES AND LONDON OFFICE: 6 ARLINGTON STREET, ST. JAMES'S S.W.1.

Telephone: HYDe Park 9516/9 Telegrams: "Chromechem", Piccy, London.

VIEWPOINT

US Chemicals Abroad

LACK of UK investments in the Commonwealth and other parts of the world such as South America is indeed marked when compared with US chemical participation all over the world. In this column on 1 December, mention was made of the growing number of American chemical companies which are setting up subsidiaries in this country and in Western Europe.

In Canada, the US has launched new chemical projects from British Columbia to Quebec. Last year US investments in Canadian industry were \$283,000 million of which \$311 million went into chemicals etc.

According to *Chem. & Engng News* (34, 48) Imperial Oil Ltd., 70 per cent owned by Standard Oil of New Jersey, is constructing plant at Sarnia to produce petrochemicals and Canada's first alkylate detergent. Du Pont is considering sites for petrochemical plant to produce among other products, polythene. Next year Union Carbide of Canada will produce polythene and ethylene glycol as will Dow Chemical of Canada.

Several US companies are participating in Canada's newly developed potash mining industry in Saskatchewan. Canadian Titanium Pigments Ltd., a subsidiary of US National Lead, has a new \$15 million plant under construction. Canada's first hydrofluoric acid plant is being constructed by Nichols Chemical Co. Ltd., an affiliate of Allied Chemicals' General Chemical Division. The company has already completed the first liquid aluminium sulphate plant at Thorold, Ontario. Also under way in Canada are many US projects for sulphur and sulphuric acid production.

What of US interests in Britain's chemical industry? Quite a few of the new US operated or associated companies in Britain are concerned with petrochemicals as, for example, Oronite Chemicals' affiliated company, Grange Chemicals Ltd. Esso Petroleum's new plant for butylene, ethylene, butadiene and intermediates at Fawley, is being set up with US participation. It is reported that another US affiliate is planning a \$25 million plant near the Fawley refinery (which will supply the feedstocks), with a capacity for 10,000 tons of polythene. Other units are to follow.

The plastics and coating resin manufacturers Dow Chemicals has also set up in conjunction with Distillers Co. Ltd. an associated company, Distrene Ltd., which is already producing Styron (styrene polymer). Monsanto is now building a new phthalic anhydride plant in Wales which is to boost Monsanto's output of this chemical to 15,000 tons a year. Du Pont also plans to enter the British chemical market more widely.

Harshaw Chemical Co. has sent personnel to Britain to install equipment at its plant at Harshaw Chemicals Ltd. National Lead's subsidiary in London, Abbey

Chemicals Ltd., is to supply the British market with chemicals, including stabilisers for vinyl plastics, gelling agents and pigments for paints etc.

In Mexico, production of industrial chemicals and agricultural products by US and local companies for Mexican home use is reported to be increasing.

US prospects in South American chemical developments are believed to be particularly bright. Nearer these shores, in France and Germany particularly, US chemical manufacturers have affiliates and subsidiaries.

In Japan, polystyrene is being manufactured by Asahi-Dow Ltd., jointly owned by Dow Chemical International and Asahi Chemical Industry. Rayonier Inc. and its Canadian subsidiary have formed Nihon Rayonier Kaisha to supply chemical cellulose.

In Australia, National Lead has a new plant for concentrating rutile. At Geelong, Victoria, United Carbon and Shell are setting up what may be the first petrochemical plant in Australia.

It is perhaps fortunate that Government financed assistance is discouraging to private capital for this appears to be a main reason why US chemical industry investments in Great Britain, Western Europe, the Far East, Africa and Australia are on a smaller scale than in South America, Mexico and Canada. Another reason is that Britain and Western Europe's own chemical industries have increased greatly over the last 10 years.

As a purchaser of US chemicals, Canada has, however, been outstanding. In 1955 her share of US chemical export trade equalled 80 per cent of US exports to Western Europe. Canada is in an unenviable position due to her dependence on production and export of primary commodities. But the US has realised the value of investing in Canada's future developments and is associated in many instances in exploiting Canada's basic raw materials and the new petroleum industry. The US is thereby safeguarding her own interests, for eventually as Canada's chemical industry gets under way, her need of US exports would diminish.

Participation of US capital and US 'know-how' in Canada has been welcomed by some Canadians, but there are others who consider that Canadian taxes favour US interests against the Canadian investor. Lack of capital, 'know-how,' and trained personnel has undoubtedly hindered Canada's chemical development and this reflects very badly on Great Britain. But even in Great Britain there has been a marked increase in the number of US British subsidiaries and affiliates. The explanation is continued under-investment by British concerns and the Government, combined with over taxation, maintenance of over-extended commitments and heavy Government expenditure.

RAMSAY DINNER

Scottish Event Attracts Many Top Chemists

SPEAKING at the annual Ramsay Chemical Dinner in the Central Hotel, Glasgow, on Thursday evening, 6 December, Dr. D. W. Kent-Jones, president of the Royal Institute of Chemistry, said that there was now scarcely an industry that could be run effectively without the chemist.

Much of the prosperity of this country had depended in the past, and would depend still more in the future, on the chemist.

Dr. Kent-Jones said that probably relatively few people in the room had met or even seen Sir William Ramsay, the great Scottish chemist in whose memory the dinner was held, although all would have heard of his work.

'In my student days, before he was almost a romantic figure in the world of chemistry, his researches seemed always to touch upon exciting, extremely new, and stimulating subjects,' he said.

'The proof given by Ramsay of the actual transformation of one element into another ushered in a new era in chemistry, and was indeed his greatest contribution to science, although there are many others also of great importance.'

Importance of Chemists

Dr. Kent-Jones said that when he decided to become a chemist about 1908-1909, the number of people practising in the profession was very small.

He continued: 'Today there is scarcely an industry that can be run effectively without the chemist. Great Britain is now one of the greatest chemical countries in the world. Even the future of the atomic age rests with the chemist and the chemical engineer rather than with the physicist.'

'The task of those of us responsible for the education, training, and proper functioning and behaviour of chemists is not a light one, for much of the prosperity of this country has depended in the past, and will depend still more in the future, on the chemist.'

Referring to the 'serious problem of the nation's increasing demand for scientists of all types,' and to the competition between arts and science in the schools and universities, Dr. Kent-Jones said the study of science had been regarded as something rather inferior or less desirable than the study of the arts. The impression sometimes arose that the chemist, for instance, was a less generally educated person than the arts man.

'I know both sides,' he said, 'and would like to stress that chemists as a

whole are far from lacking in an appreciation and knowledge of the arts.

'What is quite certain is that the scientist, skilled in his subject, is almost invariably more knowledgeable about the arts than the arts man is about science.

'Secondly, more and more students must turn from the arts to science. Our present high standard of living is today more due to science than to art, and it is time that this was quite bluntly proclaimed. As a rule, scientists have a peculiarly broad education.'

Chemistry and Law

Lord Cameron, the well-known Scottish Judge, proposing the toast 'The Profession of Chemistry,' said that chemistry and law were not so far apart as might be thought at first. They had, as so many professions had, a common philosophical basis.

'There is no conflict between the scientist and philosopher, and the lawyer,' he said. 'We are all, in essence, philosophers in the truest sense, for both are lovers and pursuers of wisdom. Whether we wisely use the products of the pursuit is entirely another matter.'

Lord Cameron said that the profession of chemistry had been, and was, a most valuable ally both in the detection and prosecution of crime, 'from the days of the late Mr. Sherlock Holmes onwards.'

Other speakers at the dinner were Dr. J. Clark, chairman of the Nobel division of Imperial Chemical Industries Ltd., and Dr. K. A. Williams, president of the Society for Analytical Chemistry.

The dinner was held under the auspices of the Society of Chemical Industry (Glasgow section), Royal Institute of Chemistry (Glasgow section), Chemical Society (Glasgow area), Andersonian Chemical Society, Ardeer Chemical Club, Glasgow University Alchemists' Club, Oil and Colour Chemists' Association, Society for Analytical Chemistry (Scottish section), Institute of Fuel, Plastics Institute, and the Anthraquinone Club.

Brazilian Atomic Energy

SAO PAULO will shortly have its own atomic power plant for producing electricity, Diano de Comercio reports. The American and Foreign Power Co. will be undertaking to build the plant following negotiations between the US and Brazil on atomic energy.

Lampblack Factory

Erection Completed at Essex New Town

A NEW lampblack factory was completed during November at Basildon New Town, Essex, for the Ship Carbon Co. of Great Britain Ltd. The contract for the engineering and erection was carried out by W. J. Fraser & Co. Ltd., of Romford, Essex. Certain major items of equipment were fabricated at their works at Monk Bretton, Barnsley, Yorks.

Lampblack is used in relatively large quantities by tyre and general rubber manufacturers.

Technically the process is a modern version of the traditional method of manufacturing lampblack in that it consists of subjecting selected oils to a process of incomplete combustion.

With a product of this sort, gaseous effluents require a very high degree of cleaning, and particular attention has been directed to this with the aim of producing a final gaseous discharge to the chimney stack completely free from any solid or noxious constituents.

The whole of the work was completed one month ahead of the scheduled programme.

New Packaging Body

AFTER discussions between leading manufacturers of various types of packaging films, the Packaging Films Manufacturers' Association was recently formed. The Association will not be concerned in any way with price policy, negotiations with trade unions, or matters involving sales to or purchases from individual firms or trade groups. Membership is open to manufacturers of packaging films in the UK, and the initial membership includes all known manufacturers of transparent regenerated cellulose film, polythene, cellulose acetate, p.v.c., rubber hydrochloride and polyester rubber. The address of the secretaries of the Association is 301 Glossop Road, Sheffield 10.

BTH Laboratories

SPEAKING to trade and technical journalists at the British Thomson-Houston laboratory, Rugby, on 29 November, Mr. L. J. Davies, BTH director of research (and also a director of the AEI Lamp and Lighting Co.) stated that the new engineering development laboratories were being built at Leicester adjacent to the lamp works at Melton Road. The foundations of the new building had already been laid and it was expected to be completed in the course of the next 18 months.

NOTE & COMMENT

SUCROCHEMISTRY

IT HAS been said that until stocks of coal and oil are seriously depleted, agricultural chemicals cannot compete economically. However, as Professor Wiggins, director of sugar research, Imperial College of Tropical Agriculture, Trinidad, pointed out in a recent lecture on chemistry and the sugar cane (see also page 443), 'The sugar industry possesses a number of products which could be envisaged as raw materials instead of waste products and, what is more, produces them in large quantities.' Moreover, 'these materials are obtained annually from the soil just as interest is produced on capital; they are not made by making inroads into capital which is the case with coal and oil.'

It is more than likely that agricultural chemical raw materials will compete with some oil and coal chemical byproducts. In at least one instance a 'sucrochemical' is already competing with an oil industry product.

Alcohol production by fermentation of molasses is still important in spite of the output from the petroleum industry. Also, the sugars in molasses (estimated to cost about 4d a pound) can form a cheap raw material for chemical processing. Today, there are possibilities of producing synthetic lactic acid economically; and even more promising is the semi-continuous production of levulinic acid which could become a useful organic intermediate. Preparation of imidazoles and pyrazines from ammoniated molasses is also of importance.

DETERGENTS

PRODUCTION of detergents from sugar has more than a little significance. At least one US company has developed a commercial process for doing this. Estimated cost of production in March of this year was 13 cents per pound and according to the company the product could sell at 18 cents per pound. With the oil situation as it is now, detergents from petrochemical sources must cost more. Perhaps detergents from sugar will prove to be no more costly in the long run.

Synthetic textile fibres can be obtained from sugar suitably processed. So can some pharmaceutical chemicals, drugs, and other substances of medical interest such as dextran.

Glycerine, ethylene and propylene glycols can be obtained by drastic hydrogenation of sugar. Germany, during World War II, obtained these materials in this way and now at least one large US chemical manufacturer is obtaining pure glycerine from sugar economically.

Last waste material of the sugar industry—filter press mud or vacuum filter cake, is a useful fertiliser and of value for its high content of hard wax and fatty materials. Of good quality, the wax is suitable for use

in the carbon paper industry and for emulsion floor polishes. The US and Cuba use about 1,000 tons of wax annually, but British West Indies have so far been unable to find a market for their material. The fatty materials, since they provide two important sterols, sitosterol and stigmasterol, are of interest to the pharmaceutical industry.

In view of the oil shortage and all that may follow, the possibilities offered by sucrochemistry should be carefully investigated and assessed now.

OIL AND CHEMICALS

IN THE CHEMICAL AGE of 8 December, the answer to a question in the House of Commons about raw material supplies to plants producing petrochemical chemicals was reported. *The Economist* of 8 December, discussing the effect of the oil shortage on refinery throughput, suggests that petrochemical plants may be threatened with wholesale disruption of supplies.

Petrochemical plants can continue to obtain supplies of naphtha from straight-run distillations subsequent to any cracking or reforming operations. However, it is disturbing to learn that refineries are already considering the incorporation of a high proportion of the naphtha present in crude oil into finished motor spirits in order to increase its volume.

Particularly disturbing is the situation of the solvent plant at Stanlow and other similar plants. The Stanlow plant produces about 60 per cent of all solvents made in Great Britain from the propylene gas coming directly from the Stanlow cat cracker. Although there are alternative sources of propylene, it is not thought that these could provide enough gas to maintain normal levels should the Stanlow cat cracker be shut down.

Unless some agreement can be reached between chemical plant directors and those concerned with the sale of petrol, it seems that the UK and probably other European countries similarly placed, will be forced to obtain oil-based organic chemicals from the US.

New Alloy Steel

A PRELIMINARY information sheet on Langalloy 20v has been published by Langley Alloys Ltd., Langley, Slough, Bucks. Langalloy 10v is described as an austenitic alloy steel of high nickel and chromium content and containing small amounts of molybdenum and copper.

In addition to having the corrosion-resisting characteristics of the normal austenitic stainless steels, Langalloy 20v is claimed to possess good resistance to sulphuric acid at all concentrations and at temperatures up to 80° C.

● MR. E. P. HUDSON, assistant managing director and technical director of Scottish Agricultural Industries Ltd., Edinburgh, has been appointed chairman of the Edinburgh and South-East Scotland Regional Advisory Council for Technical Education. He has been a member of the Council since it was reconstituted last August. He succeeds Mr. W. L. SLEIGH, of Rossleigh Ltd., Edinburgh, who retired recently because of ill health.

● At the anniversary meeting of the Royal Society held on 30 November, SIR CYRIL HINSHELWOOD was re-elected president, SIR WILLIAM PENNEY, director of the Atomic Weapons Research Establishment, Aldermaston, was elected treasurer in succession to SIR THOMAS MERTON. Among other members of council elected were: PROFESSOR C. E. H. BAWN, professor of inorganic and physical chemistry in the University of Liverpool; BRIGADIER J. S. K. BOYD, O.B.E., lately director of the Wellcome Laboratories of Tropical Medicine; SIR CLAUDE GIBB, chairman and managing director of C. A. Parsons & Co. Ltd.; DR. B. F. J. SCHONLAND, deputy director, Atomic Energy Research Establishment; and PROFESSOR M. STACEY, professor of chemistry in the University of Birmingham.

● MR. JAMES W. HUTCHISON has been appointed vice-president in charge of production at Olin Revere Metals Corporation, NY. Mr. Hutchison had been plant manager of the Jones Mill Reduction Plant, Malvern, Arkansas, of Reynolds Metals Company. Prior to this association at Reynolds, Mr. Hutchison had been with the Aluminum Corporation of America. He will make his headquarters at Omal, Ohio. Mr. Hutchison has been in the aluminium business for 21 years.

● At the annual general meeting of the British Tar Confederation on 26 November, the following were elected as officers of the Confederation for the year 1956/57: *president*: SIR HAROLD SMITH, K.B.E., D.L.; *honorary treasurer*: MR. L. W. BLUNDELL; *chairman of the executive board*: MR. R. H. E. THOMAS, O.B.E.; *vice-chairman of the executive board*: SIR HENRY F. H. JONES, M.B.E., M.A.; MR. STANLEY ROBINSON. The following constitute the Board for the year 1956/57: *representing the Association of Tar Distillers*: MR. L. W. BLUNDELL, MR. C. E. CAREY, MR. J. COLLIGON, MR. E. HARDMAN, MR. C. LORD, MR. WM. McFARLANE, MR. STANLEY ROBINSON, MAJOR A. G.

People in the NEWS

SAUNDERS, MR. J. B. VICKERS, MR. W. A. WALMSLEY; *representing the British Coking Industry Association*: LT.-COL. P. F. BENTON JONES, MR. J. BERRESFORD, MR. K. MCK. CAMERON, MR. F. W. O. DODDRELL, MR. C. F. DUTTON, MR. C. M. FRITH, MR. W. D. HOLT, MR. C. F. SULLIVAN, MR. R. H. E. THOMAS, O.B.E.; *representing the Gas Council*: MR. S. BLACK, MR. R. N. B. D. BRUCE, O.B.E., T.D., MR. D. D. BURNS, O.B.E., MR. JAMES CARR, O.B.E., M.C., MR. E. H. HARMAN, MR. W. HODKINSON, O.B.E., MR. W. K. HUTCHISON, C.B.E., SIR HENRY F. H. JONES, M.B.E., M.A., MR. A. McDONALD, MR. J. POWDRILL, M.B.E.; *representing the Low Temperature Coal Distillers' Association of Great Britain Ltd.*; COMMANDER COLIN BUIST, M.V.O., R.N. (retd.).

● The platinum medal for 1957 has been awarded by the Institute of Metals to DR. MAURICE COOK, joint managing director, Imperial Chemical Industries, metals division, for his contributions to the science of metallurgy, the non-ferrous metals industry and to the welfare of the metallurgical profession. DR. H. K. HARDY, research manager, UK Atomic Energy Authority, has been awarded the Rosenhain medal for 1957 for his contributions to knowledge in the field of physical metallurgy.

● Sheepbridge Engineering Ltd. announces that MR. C. HAND has been appointed to the board of the subsidiary company, Sheepbridge Equipment Ltd.

● Three changes are announced in the board of dyestuffs division of Imperial Chemical Industries Ltd. MR. S. HOWARD, formerly division joint sales director, has been appointed division managing director jointly with

MR. H. JACKSON and MR. H. SMITH. DR. H. SAMUELS, formerly joint deputy north regional manager, has been appointed division home sales director. MR. R. M. GIBB, formerly head of dyestuffs division distribution centre, has been appointed a division director in charge of commercial services.

● MR. A. L. CURTIS has been appointed a director of United Coke & Chemicals Co. Ltd. Mr. Curtis joined the company in 1942 as chemical works manager at its Orgreave works, near Rotherham. He became operations manager in 1947, a position which he continues to hold.

● DR. G. L. RIDDELL, director of research of The Printing, Packaging & Allied Trades Research Association, is relinquishing his appointment with that body to join Albert E. Reed & Co. Ltd., as head of the packaging research and development division.

● The following were elected as fellows of the Institute of Physics on 4 December: A. H. ANSTIS, C. E. CHALLICE, G. M. LEAK, J. R. STANSFIELD, W. D. BENNETT, A. J. DYER, J. G. POWLES, and E. J. W. WHITTAKER.

● SIR FREDERICK ARMER, has been appointed chairman of the sub-committee set up by the Central Advisory Water Committee to inquire into the law dealing with trade effluents. Those wishing to give evidence to the sub-committee should get in touch with Mr. H. R. Pollitzer, secretary, Trade Effluent Sub-Committee, Ministry of Housing and Local Government, Whitehall, London SW1.

WILLS

MR. ALGERNON SMITH GIBSON, of Connaught Court Hotel, West Hill Road, Bournemouth, retired manufacturing chemist, who died on 27 July last, left £16,309 9s 9d gross, £16,055 11s 1d net value. (Duty paid £1,613.)

MR. LAURIE ALEXANDER GOW, of 53 Kremlin Drive, Stoneycroft, Liverpool, chairman and managing director of Hunter & Gow Ltd., manufacturers of insecticides and fertilisers, and horticultural sundries wholesalers, who died on 6 September last, aged 75 years, left £28,712 6s 6d gross, £28,207 0s 0d net value. (Duty paid £5,002.)

Some Developments in Sucrochemistry

IN A PAPER read to the Commonwealth Section, Royal Society of Arts, Professor L. F. Wiggins, director of sugar research, Imperial College of Tropical Agriculture, discussed the present and future impact of chemical science on the cane sugar industry.

In considering chemistry and sugar technology, Professor Wiggins reported that a method of removing evaporator scale consisting essentially of calcium compounds has been developed in Trinidad. It involves the use of ethylenediamine tetra-acetic acid in slightly alkaline solution. This complexes the calcium salts, which are the main constituent of the scale, converting them into soluble materials which can be easily washed away from the sides of the evaporator tubes. Metal parts of the evaporator are not affected by this procedure.

The main theme of Professor Wiggins paper is, however, the impact of chemistry on the sugar cane industry. There is now an increased interest in the possibilities of the chemical utilisation of sugar and the byproducts of the sugar industry. Just as a special branch of science, petrochemistry, has evolved around the full utilisation of oil, so in the sugar industry there is growing up a similar field—sucrochemistry.

Products as Raw Materials

Products of the sugar industry which can be envisaged as raw materials instead of waste products are listed by Professor Wiggins as sucrose (40 million tons annually), molasses (1 billion gallons annually), lagasse (25 million tons dry weight annually), and filter mud (2 million tons dry weight annually). A particular point of interest is that these materials are, of course, obtained annually from the soil and are not made by making inroads into capital which is the case with coal and oil.

Consideration of what the chemist can do with the sugar molecule proves interesting.

Professor Wiggins reported that it has recently been found possible to introduce a single fatty acid group into the sucrose molecule and the products

obtained show promise. One such product is sucrose monostearate which has the inherent characteristics of a surfactant, i.e., it has water repellent and water attractive parts. Maximum amount of detergency is obtained when the number of carbon atoms of the fatty acid equals the number of carbon atoms of the sugar. Sugar detergents evolved to date are non-toxic and tasteless and non-irritant to the skin and membranes of the eyes—properties of importance in shampoos, toothpastes, etc.

The fact that monoesters of various types can be prepared from sucrose opens up a wide field in sugar chemistry. Unsaturated fatty acids such as oleic and linoleic acids have been attached to sucrose and it has been found that the products formed have excellent drying oil properties.

Reaction Not Understood

A reaction which at present is not well understood is the reaction of sucrose with hydrogen and ammonia in methanol at 130°C and 100 atmospheres pressure. The sugar molecule is disrupted and is converted into 2-methylpiperazine. This reaction could be of importance if the yield can be improved, states the professor, for 2-methylpiperazine could be used in making nylon-like synthetic textile fibres replacing the hexamethylene iso-diamine ordinarily used in nylon synthesis. Another use for this particular compound would be in the pharmaceutical and veterinary fields since piperazines are of value in the treatment of intestinal parasitic infestations.

According to Professor Wiggins, economic manufacture of fructose from sucrose is now possible. He quotes a price of 5s per lb., assuming non-recovery of the glucose moiety. It appears that there is considerable interest in the US in fructose, due to its possible use in the diet of diabetics, certain of whom may be able to consume fructose without recourse to insulin injections.

A straightforward method of manufacture of mannitol and sorbitol from sugar by hydrogenation is also of importance. Hydrogenation under more drastic conditions, produces break-

down of the sugar to give glycerine, ethylene and propylene glycols. This technique is being used by a US chemical company. Professor Wiggins reported, to obtain pure glycerine, which competes with the petrochemical industry's production of this material.

Important and interesting products from sucrose are obtained when it is used as a substrate for micro-organisms. Such a product is dextran, a blood plasma substitute. Another possibility appears to be the production of pure cellulose by the growth of organisms such as *Acetobacter xylinum* on sucrose.

Despite serious competition from the petroleum industry, fermentation of molasses to produce substances of industrial value such as alcohol, is still of importance. The sugars in molasses form a cheap raw material for chemical processes.

Two reactions considered of potential importance by Professor Wiggins are the acidic and alkaline degradations of sugars in molasses. At the Imperial College in Trinidad a continuous reactor has been devised for the alkaline degradation of sugar to lactic acid and it has been demonstrated that continuous production of this acid is a possibility. Where a three-carbon system is necessary, there is a chance for synthetic lactic acid, provided it is cheap.

Levulinic Acid

Acid degradation of sugars leading to levulinic acid appears to be more promising. Semi-continuous production of this acid has been developed in Trinidad using high temperature and pressure reaction of molasses with dilute hydrochloric acid. A selling price of 5s per lb. is likely, but since levulinic acid is a versatile organic compound in Professor Wiggins's estimation, it may prove to be a useful organic intermediate for the fine chemical industry.

Recently, the reaction of molasses with ammonia has been studied. As a cattle food molasses is deficient in nitrogen. Combining the sugars in molasses with ammonia to produce a more valuable food was attempted. It was found that if the molasses sugar

[turn to next page

NICKEL DEVELOPMENTS & PRICE

New Project in Manitoba Will Cost \$175 million

FOLLOWING the simultaneous announcements in Canada by the International Nickel Co. of Canada Ltd., of its \$175 million project in Manitoba for opening two new nickel mines and of an increase in the price of nickel, the Mond Nickel Co. Ltd. has also announced that it is raising its price for refined nickel in the UK to £600 per ton delivered works, with appropriate increases for other countries.

Inco's regular 1955 annual nickel-producing capacity will be raised by approximately 130 million lb. to 385 million lb., or by 50 per cent, of which some 24 million lb. will be regular production to replace existing temporary premium-priced production for the US national stockpile. On the basis of Inco's programme and the announced expansion plans of others, Inco's president, Henry S. Wingate, forecast that total free world nickel capacity some four years from now

may be of the order of 600 million to 625 million lb. or an increase of about 175 million lb. to 200 million lb. from all sources above the total of 427 million lb. for 1955. This does not take into account the prospect of increased Cuban output beyond the 50 million lb. annual capacity which the UK will shortly have available from its own Cuban plant.

Cost of Inco's Manitoba explorations is some \$10 million. There is a fairly wide variation in the grades of ore in different parts of the deposit. The company therefore plans to develop tonnage and grade potentials sufficient to maintain large nickel production and the longest possible future life of this area.

The new town and the plant site, as well as the immediately adjacent mine, are to be named Thompson in honour of Dr. John F. Thompson, chairman of the Board of Inco.

TECHNOLOGY & THE FREE TRADE AREA

MUCH was being heard of the proposals for a European free-trade area, remarked Mr. W. T. Winterbottom, chairman of Fine Spinners & Doublers Ltd., at a meeting of the Textile Institute in Bradford on 4 December. This matter was receiving careful consideration by the Government and by all industries which would be affected by it. There were hazards, and these must be given due consideration in all deliberations.

Safeguards would be necessary, and there were many details to be worked out, but participation in the project could succeed or fail in the long run on the technological side.

If the free-trade area was to be of benefit to the UK, technology would have to be developed so that this country could continue to compete with other European industries on colour, design and style as well as price.

UK Losing Business

There was evidence that the UK was actually losing business now through shortcomings of colour, style and design in certain sections of the textile industry. On the continent there had always been concentration on this aspect of quality, while British goods had traditionally been made to last.

Mr. Winterbottom said they had to be quite sure that British technologists were as much in the lead as they were in the old days, so as to trade in this common market in the safe knowledge

that their production technique and design and styling could continue to hold their own against the best products of the continental countries. Only in that way could the common European market be of lasting benefit to this country.

Natural Gas at Cousland

THE Scottish Gas Board proposes to carry out a prolonged test of the natural gas resources existing at Cousland, near Edinburgh, to establish whether the supplies of town gas to consumers could be augmented from this source on a commercial basis.

While the test is in operation, gas consumers in the Musselburgh and East Lothian areas of Scotland will be using in their homes and factories town gas consisting of a mixture of natural gas and coal gas.

The presence of natural gas at Cousland was proved by an exploration well drilled by the BP Exploration Co. before the war. Natural gas has a calorific value of more than double that of coal gas normally produced in continuous-vertical-retorts.

New Office for Analysts

THE registered office of the Association of Public Analysts has moved to Bank Chambers, 16 Southwark Street, London SE1 (telephone: HOP 2067).

Sucrochemistry

[from previous page]

was previously 'inverted,' as much as 6 per cent of nitrogen bound in an organic form could be introduced. The resultant product, however, had toxic properties. Chemical examination revealed that ammoniation resulted in the transformation of reducing sugars to imidazole and pyrazine derivatives and the toxicity was due to 4(5)-methylimidazole. Solvent extraction or acidification removes the imidazoles and pyrazines formed. While the ammoniated molasses is not likely to have wide usage as a cattle food because cattle do not appear to be able to utilise the nitrogen in the product, the reaction could be of importance in preparing the above mentioned chemicals.

Bagasse, the major constituent of the sugar-cane plant, is used for paper-making and recently ammoniated bagasse pith has proved a useful cattle food. Filter press mud is at present used for its fertiliser value on the cane lands. However, this waste material contains considerable quantities of hardwax and fatty materials—sometimes up to 30 per cent of its dry weight. Dr. Wiggins reported—which can be removed with petroleum solvents. In the US some 1,000 tons are produced and used annually.

The fatty materials are of interest, since hydrolysis of the crude material leads to isolation of two sterols, sitosterol and stigmasterol, both of which are important in the pharmaceutical industry for the production of medicinal steroid compounds.

Also contained in the fatty material and cane wax is arylalcohol, essentially a C_{30} alcohol. The fatty material yields about 10 to 15 per cent and the wax about 30 per cent of arylalcohol. Saturated and unsaturated acids can also be isolated from the fatty material. Thus, even the lipid constituents of the sugar cane can give several industrially valuable materials.

Italian Chemical Trade

AT THE RECENT meeting of *Asschimici* in Milan, the president of the Association informed his listeners that the balance of Italian foreign trade is not favourable to Italian chemical industry. Figures now available for the first eight months of 1956 show that Italian imports of chemical products have risen by 18.7 per cent in quantity and 27.58 per cent in value, while the corresponding increases in exports of chemical products reached only 13.8 per cent and 6.21 per cent respectively.



Front view of the laboratory at Vlaardingen

UNILEVER NV RESEARCH

New Laboratory for Oils and Fats Opened in Holland

THE NEW Unilever research laboratory at Vlaardingen, Holland, was opened by the Prime Minister of the Netherlands, Dr. W. Drees, on 16 November.

Speaking at the opening ceremony, Mr. F. J. Tempel, chairman of Unilever NV, announced that the company had decided to make available Fl.500,000 (£50,000) for chemistry scholarships. The scholarships would be awarded to those students from Dutch universities and schools who achieved the best results in chemistry in any academic year.

Mr. Tempel went on to say that in the past, industry had been dependent on research by universities and individual inventors, but in this century we had seen the rise of systematic research undertaken by industry itself and aimed directly at developing its production programmes. This research, said Mr. Tempel, had a dual purpose—to improve existing products and to find new ones. Experience had shown that revolutionary changes could be expected only from fundamental scientific research. Industry would

therefore also have to undertake fundamental research.

Declaring the laboratory open, Dr. Drees said that developments of that kind were welcomed by the Netherlands Government. The Dutch Government, he continued, was doing much for the development of scientific research, but it could not hope to fulfil the entire needs of the country. For that reason he was grateful to Unilever for its proposed scholarship awards in chemistry.

Referring to the contribution of the Unilever organisation to the prosperity of the Netherlands, Dr. Drees said that in 1955 Unilever's exports amounted to Fl.330 million (£33m).

During the ceremony, the Prime Minister announced that Queen Juliana had appointed Dr. J. P. K. van der Steur, head of Unilever Research for Western Europe, an officer in the Order of Orange Nassau. The Silver Medal of Honour of the Order of Orange Nassau was awarded to Mr. J. R. Drost, an analyst in the Unilever laboratory since 1926.

Established to undertake research into oils and fats, the new laboratory replaces the company's existing laboratory at Zwijndrecht. Construction was started on 1 April 1953 and the laboratory was informally opened on 15 April 1955.

While it was being built, the company decided to add another wing to accommodate chemists working on the development of synthetic detergents. In this connection a working group from Mannheim was transferred to this new wing. The microbiological department, space for which had been provided on the premises of Van den Bergh's en Jurgens' Fabriek NV at the Nassaukade, Rotterdam, also moved into the new laboratory.

The laboratory consists of two sections. One of these was built in the period April 1953-April 1955. Building of the second section commenced in September 1954 and was completed in the summer of 1956. The first

Radio-Labeling

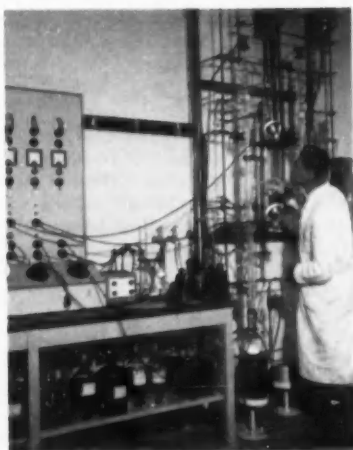
New and Simpler Method Reported to ACS Meeting

AMONG the many topics discussed at this year's national meeting of the ACS, a new and simple method of giving organic compounds radio-active 'labelling' for research was reported by K. E. Wilzbach of the Argonne National Laboratory. This involves no more than exposing the compound to tritium gas. The labelling is at random—it is not placed at any particular point in the molecular structure, and for this the method of preparation by synthesis must continue to be used. Nevertheless, there must be many investigations where only the movements or distribution of the whole compound need to be studied. Indeed, in some types of biological research, a substance that is still unknown in any precise chemical sense—an isolate of specific biological activity—could be labelled by exposure to tritium.

It was said that tritium is now so readily, and relatively cheaply, available that its use may soon surpass that of any other radioactive isotope. Its US price was quoted at two dollars per Curie. It has a short half-life and low health hazards in handling. It was reported that this simple method of labelling had been so far successfully applied to heptane, sucrose, benzoic acid, toluene, cholesterol and digitoxin.

Price Reduction

PRICE of the silicone barrier preparation Syl, manufactured by Lloyd-Hamol Ltd., has been reduced. Retail prices are: 1 oz. tube 3s, including purchase tax; 500 gram jar 8s 6d, including purchase tax.



Apparatus for fractionating volatile compounds

section is 70 m. long, 14 m. wide, and has a total height of 19 m. The second section is 24 m. long, 14 m. wide, and 19 m. high.

Equipment in the organo-synthetic department enables all types of substances to be synthesised. Apparatus is available for investigating the plastic, elastic and other rheological properties of margarine and fats. The department is also equipped with up-to-date apparatus for radiological analysis, and spectrophotometers for research in the absorption of ultra-violet and infra-red light.

Equipment installed in the technical development department includes two refining units for semi-technical quantities of oil, facilities for making catalysts and hydrogenating oils, and a complete installation for manufacturing margarine in quantities of ca. 50 kg./hr.

MANUFACTURING COSTS RISE

Chemical Firm's Trading Figures Go Down

HIGHER manufacturing costs due to rises in wages, fuel etc., and reduced production contributed to lower trading figures for 1955-56, according to a statement circulated with the annual accounts of the company by Mr. John D. McKechnie, chairman of McKechnie Brothers Ltd., Widnes and Birmingham.

Profits after taxation, he says, show a decrease of £378,816 on the previous year, due to reduced profits of the parent company; combined figures of the subsidiary companies show an increase. The directors propose to recommend a final dividend of 10 per cent which, together with the interim dividend of five per cent already paid, will make a total of 15 per cent for the year. A cash distribution of two-and-a-half per cent out of capital profits was made in September. The annual meeting will be held in Birmingham on 19 December.

During the year, continues the statement, the McKechnie Group financed capital additions amounting to £539,288. The parent company's expenditure totalled £462,328, of which £259,826 was spent on the new factory at Aldridge, Staffordshire, and most of the remainder on new plant and buildings at the Widnes works. It is likely to be three years before the transfer

from the old works at Rotton Park Street, Birmingham, is completed.

Adequate facilities for research now exist at Aldridge and Widnes and the company's research and development departments have been reorganised. The titanium pilot plant has worked satisfactorily and a great deal of useful knowledge has been gained. At present there is no demand for the company's sponge in the UK and it relies on the export of small quantities. Experimental work on the production of titanium sponge at Widnes will continue, and the extrusion of titanium billets at Aldridge is to be investigated.

McKechnie Brothers Ltd. produces at Widnes sulphate of copper, lithopone, electrolytic copper cathodes and powder as well as titanium sponge; at Birmingham and Aldridge extruded rods and sections etc; and at London solder and anti-friction metals.

The chairman adds: 'The United Sulphuric Acid Corporation's value to us has not yet been shown, as the cost of the acid which we have to take under our quota is still a great deal higher than that of the acid we make ourselves, and the effect on the manufacturing cost of our chemical products is serious. Orders for our chemical products are about on the same basis as for the corresponding period last year.'

ELECTRICAL DESALTING UNIT

WHAT is claimed to be the largest plant in the world to purify salt water electrically is ready to go on stream at Bahrain in the Persian Gulf.

The Bahrain Petroleum Company Ltd., a member company of the Caltex Group, is installing the plant to produce 86,400 gallons per day of fresh water to supply the drinking and cooking water needs of a community of about 5,000 persons centred in Awali near the Bapco refinery. The desalting plant was manufactured by Ionics Inc., a Cambridge, Mass., US, firm.

Input water for the Bahrain plant comes from wells drilled on the island. The wells are within sight of the Persian Gulf, but contain only 1/14th as much salt.

The desalting plant is automatic in operation. Principal operating costs are electricity and occasional replacement of thin plastic membranes, of which 4,500 are used in the plant. Fifteen kilowatt hours of electricity will make 1,000 gallons of fresh water from the feed water. Membrane replacement costs are expected to be less than 50c per 1,000 gallons.

The Ionics plant consists of 15 basic desalting units, each about the size of an automatic washing machine. The 15 units are connected in three parallel banks of five series units.

In the series, each of the five units removes up to 40 per cent of the salt present at the beginning of the cycle, so that input water of 3,100 parts per million of dissolved solids is converted to produce water of less than 450 parts per million of dissolved solids.

Reactor Systems

REPLYING to Mr. Mason, who asked to what extent the Atomic Energy Authority was giving consideration to the building of atomic energy package stations, The Lord Privy Seal, Mr. R. A. Butler, said in the Commons on 5 December that the Authority was examining a number of advanced reactor systems, some of which might be particularly suitable for development on a small scale. None of these, however, was likely to reach the stage of commercial use for some time.

FBI Register

Massive Publication Lists Over 7,500 Firms

THE FBI Register of British Manufacturers now in its 29th edition runs to over 1,129 pages and lists the products of some 7,500 firms under 5,000 headings. It is truly a publication worthy of the Federation and one that will be used and studied carefully all over the world. There are glossaries in three languages and these, together with the classified lists, provide buyers with a ready means of discovering how to obtain supplies of any and every product in which they may be interested.

Particularly useful is the alphabetical directory of all the member firms of the FBI, listing names, addresses, range of products or services and so forth. The trade associations section is valuable as is the brands and trade names section which provides a list of many hundreds of names arranged alphabetically for rapid identification.

Other sections deal with products and services, trade marks and the aims and activities of the FBI.

Valve Welding

AN installation for welding flanges to valve casings has been supplied to Newman, Hender & Co. Ltd., Stroud, by Quasi-Arc Ltd., Bilston.

The installation consists of a welding head mounted on a pedestal which has hand-operated height and longitudinal adjustment of 10 in. and 16 in. respectively. The welding head can thus be positioned accurately over the work. A curved nozzle is used to give access between the flange and the valve casing. Controls for the welding head are mounted on the pedestal.

It is said that the equipment is used in conjunction with a standard 10 cwt. manipulator, the rotation of which is electronically controlled by remote push buttons at any selected speed between 0.05 to 0.95 r.p.m.

The same installation can be used for welding a wide range of components on which circumferential welds are required; this would usually only mean having suitable locating jigs on the manipulator faceplate.

Accelerator for Japan

THE first particle accelerator to be built in the US for use in Japan has been ordered by Japan's recently-established Atomic Energy Research Institute. The machine, a two-million-volt Van de Graaff accelerator, will be built by High Voltage Engineering Corp., Cambridge, Mass.

*This report has been prepared
by research workers of Chas.
Pfizer & Co. Inc.*

Production of Citric Acid by Fermentation

BY THE TURN of the present century it had been demonstrated by Wehmer (1) that the production of citric acid by fermentation was feasible. In 1923, after a research project lasting many years, Chas. Pfizer & Co. Inc., US, succeeded in transforming the fermentation of citric acid into a practical technology.

Previously, citric acid had been the monopoly of the citrus fruit growers, and particularly of the Italian lemon groves. The Pfizer fermentation process was based on the fermentation of molasses by the mould *Aspergillus niger*. (Wehmer's work had been concerned with two *Citromyces* moulds). It is an interesting fact that, in spite of the immense volume of technical 'know-how' developed, the mechanisms involved in the mycological fermentation of sugars into citric acid are still imperfectly understood.

It is also interesting to note that the extraction of the citric acid from the fermentation 'broth'—namely, the precipitation of 'citrate of lime,' followed by the decomposition of the latter with the aid of sulphuric acid into citric acid—is still based on the classic method of Scheele, who first obtained crystalline citric acid from lemons in 1784.

Plant in Britain

By 1938, a fermentation plant had been set up in England and as British production increased, so US exports to Britain, the main purchaser of US citric acid, declined. Between 1937 and 1939, American production of citric acid dropped from 18.1 to just under 13.5 million lb. But the war years more than redressed the loss. By 1947 US annual production was running at some 30 million lb. per annum. Industrial demand in America, as elsewhere, has continued to increase.

Today the US domestic company of the Pfizer organisation, at its Brooklyn plant, is a large importer of molasses. As a passing indication of the scale of production, it may be mentioned that molasses for the fermentation tanks are brought directly by tanker to the Pfizer wharf on the East River in Brooklyn and there piped into two holding tanks which together hold five million gallons.

As citric acid is a natural fruit acid, its pleasant taste, non-toxicity and ease of assimilation have made it the most widely used organic acid in the food and beverage industries. As a result of the economy of the 'synthetic' fermentation process citric acid is now, moreover, one of the cheapest food acids, and food processors are guaranteed a steady supply at low cost.

Citric acid is available both in the anhydrous and hydrated form. The latter differs from the former in that it contains 8.58 per cent water of crystallisation.

The Pfizer Corporation has developed a unique method of direct crystallisation of anhydrous citric acid, to the benefit of many industrial processes in which the presence of water of crystallisation formerly prevented the use of the hydrated acid. The advantages of stability which the former has over the latter are also patent, as are the economies in long-distance transport. It is a simple matter to revise formulas when replacing the hydrated by the anhydrous acid. One merely uses 91.42 lb. of the latter for every 100 lb. of the former.

One important application of recent developments in the uses of citric acid and citrates in the food and beverage industries is the value of citric acid in the processing of 'sea-food.' The rapid growth of the frozen-food industry during the last decade has focused attention on the problem of maintaining quality during prolonged storage. Processors of frozen fish are faced with the necessity of storing highly perishable items in large quantities in order to supply the market with high-grade products all the year round, despite seasonal fluctuations of natural availability. Now maintenance of quality is no longer a problem, since citric acid has been shown to afford superior colour and flavour retention at nominal cost.

In a more domestic sense, citric acid has shown some promise in a highly specialised field of the laundering industry. This is the use of a mixture of citric acid and common salt for the removal of diaper stains, caused mainly by ointments with a cod liver oil base. This important domestic application is still in the development stage.

New Industrial Applications

In recent years a great number of new industrial applications have been found for citric acid. Hydrochloric acid, because of its dissolving action on limelike materials, is often used to raise the output of deep-water wells drilled into calciferous deposits. The expected increase in output is often not achieved, however, because aluminium or ferrous hydroxide forms after most of the acid has been neutralised. Citric acid has proved useful in preventing the precipitation of the iron and aluminium precipitates.

Today, citric acid has an even more valuable application. Oil wells produce water as well as oil. In most cases this water is returned underground to maintain the subsurface pressure. Precipitated iron has caused difficulty in these secondary oil-recovery systems by preventing the free passage of water through the rock-strata at the bottom of water-injection wells. After several years of research, it was shown that citric acid in injection-water successfully curbs costly iron-

Production of Citric Acid

plugging. Under properly controlled conditions the addition of 10 parts per million of citric acid to the injection water will eliminate this difficulty.

The value of citric acid lies in its ability to sequester iron selectively and thus prevent the precipitation of insoluble iron salts in the presence of other metallic ions such as calcium and magnesium.

By sequestering the iron, even in high-calcium waters, citric acid may obviate the use of such current methods as acidising and fracturing, and will boost the flow rate of oil at less cost. Citric acid has shown that it can make water injection more economically acceptable to the oil producer with a minimum of effort.

Another advantage of citric acid besides its sequestering ability is that it increases the efficiency of some bactericides which are ordinarily less effective in the presence of metallic ions. Citric acid averts any interaction between the bactericide and the metal ion.

Oil men gain also a third advantage through the use of citric acid in that the compound prevents the deposit of rust and scale.

Some States in the US have already successfully switched from gas and air repressuring to water flooding. In Illinois, for example, 5,690,000 barrels of new oil were recovered in slightly more than three years from approximately 7,200 flooded acres, whereas it had once taken an average of nine years to recover 4,700,000 barrels of oil from 12,500 repressured acres.

Water flooding has developed into the outstanding method of producing oil in the state of Pennsylvania. In one year it was estimated that about 80 per cent of the oil produced in the State was obtained by this method. Production of the Bradford Field, McKean County, Pennsylvania, and Cattaraugus County, NY, was increased more than 800 per cent by the water flooding method since increased recovery efforts were first noted.

Tanning Agent

Algicidal compositions containing copper sulphate are valueless when used in systems alkaline enough to precipitate the copper. The addition of citric acid will prevent the precipitation of copper hydroxide and keep the cupric ion in solution.

Herbicide compositions based on 2,4 di- and 2,4,5 tri-amine salts will react to form insoluble calcium and magnesium salts when dissolved in hard water. The addition of small amounts of citric acid to the formulation will prevent this undesirable precipitation and the resulting loss of activity.

White leather produced by the usual alum-tanning process has unsatisfactory water resistance. Better water resistance in aluminium-tanned white leather is achieved by adding a little citrate to the aluminium salts. This prevents the precipitation of aluminium at the optimum pH for tanning.

Citric acid and sodium citrate have been recommended as components of washing compositions designed to flush away radioactive contaminants. The acid will also remove radioactive matter embedded in rust and scale.

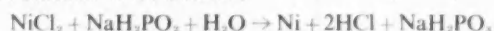
The use of caustic bottle-washing compounds in hard-water areas leads to the formation of insoluble scale on the equipment, and to spotting on the bottles. Addition of a citrate prevents the formation of these troublesome precipitates. (The soluble salts of citric acid—trisodium citrate, tripotassium citrate and diammonium citrate—are also useful sources of citrate ion. They are convenient for applications in which a compound less acidic than citric acid is desired.)

Citric acid is useful also in the preparation of household metal cleaners and polishes. It provides sequestering action, in addition to a mild acid action, and its non-toxicity makes it suited for domestic uses.

Citric acid and citrates are widely used in industrial metal-cleaning and electro-finishing processes, because of their ability to form complex metallic ions.

Electroless Plating

Particular interest attaches to the process for depositing nickel without the use of electricity. The theoretical concepts of electroless plating have been known since 1845, but Brenner and Riddell (1946) (2) were the first to develop a controlled catalytic reduction process. They determined temperature and concentration conditions which inhibited the spontaneous reduction of a nickel salt in solution to 'black' nickel. The reaction is as follows:



Under controlled conditions the reaction does not occur spontaneously. Nickel will deposit only on such catalytic surfaces as steel, iron, gold, cobalt, aluminium or nickel, or on non-catalytic surfaces which have been 'activated.'

The plating bath consists of an aqueous solution of three principal ingredients: A nickel salt, a reducing agent, and a buffering agent. Sodium citrate and sodium hydroxyacetate are the two most important buffering agents. The citrate has certain advantages. It provides a brighter plate in the alkaline bath and also acts as a sequestering agent to prevent the undesirable precipitation of basic nickel salts.

As typical of most organic acids, citric acid will react with the more common alcohols to form esters. It is possible to form acid esters as well as the normal esters. An additional feature which makes citric acid unique is that its hydroxy group may be etherified or acylated.

In the Pfizer organisation laboratory studies are continuously going on to determine whether new esterification products are worthy of commercial development; mixed esters are being investigated.

Commercial quantities of four esters, known as the Citroflexes, are offered by Pfizer in the US. They are now also marketed in this country by Kingsley & Keith Ltd. The four Citroflexes are triethyl and tributyl citrate, and their acetylated forms. They have applications as plasticisers, anti-foaming agents etc.

REFERENCES

- (1) Wehmer, C., *Chemikerztg*, 1933, 313.
- (2) Brenner, A., & Riddell, G. E., US Patent 2532283 (1950). (Research Paper RP1725, US Department of Commerce, National Bureau of Standards, 37, July 1946.)



From all Quarters



Sudanese Minerals

DISCOVERIES of iron ore and copper deposits are reported in the Red Sea area of Sudan. The iron deposit some 120 miles north of Port Sudan is said to be almost free of phosphates. It has not yet been established whether the deposits exist in commercial quantities. Members of the Sudanese Geological Survey have discovered what they believe to be quite a large deposit of high grade graphite at Merowe, some miles east of the Nile.

L-Lysine Production

L-LYSINE, one of the amino acids considered essential to human and animal nutrition, has now been produced commercially by a fermentation technique developed by Chas. Pfizer & Co. Inc., New York, US. The new process can be considered a significant breakthrough in biochemical engineering. The L-lysine produced is obtained in a highly purified crystalline form and is uncontaminated by D-lysine, an inactive form. It will be marketed in the US in the form of L-lysine monohydrochloride.

Tunisian Dyestuffs

IN THE TUNISIAN *Journal Officiel* (6 November) customs duties applicable to the following were suspended: Azo dyes—mono-azo dyes, *Light chlorantine green FGLL*; Poly-azo dyes, *coprantine green G*; Phthalocyanines and metallic compounds including halogenated, sulphonated etc. derivatives, *Helio green G*; Hydroxyquinone and anthraquinone dyes, other than vat dyes, *Alizarine cyanine green GWA*; other vat dyes, anthraquinone derivatives, *Ciba Khaki 26*.

Trade with Syria

ALTHOUGH Syria has broken off diplomatic relations with the UK, the Board of Trade understands that this is not intended to affect commercial relations. However, Syrian Government departments may not deal with UK companies and have cancelled contracts with them. The Syrian Government has also cancelled major development contracts irrespective of nationality of the contractor.

The Syrian authorities have put no restriction on normal trade and payment is being made for goods arriving in Syria, but trade generally is at a standstill; there is a reluctance to trade with the UK. Goods in transit through Syria may be affected by practical transport difficulties.

Israeli Chemicals

SIX THOUSAND TONS of potash were produced in October at the Dead Sea Works, the management of which is now in the hands of the Fertilisers & Chemical Co., of Haifa. It is hoped that an output of 80,000 tons will be obtained in 1957.

An industrial plastics research laboratory was opened at the Weizman Institute recently. Equipment is reported to have been obtained by arrangement with the US Operations Mission in Israel.

Deposits of bauxite and flint clay, said to amount to 150,000 tons, have been discovered in the Ramon area of the central Negev.

Burma's Petroleum

BURMA's new refinery is expected to come on stream early in 1957. According to a press report, Burma paid K.207 lakhs (£1.5 million) in foreign exchange in 1955 for her petroleum requirements. However, next year, the country will not only be self-sufficient in this commodity but should have an exportable surplus of 15,000 tons of petroleum products.

Argentine Imports

CIRCULAR No. 2672 issued by the Banco Central of Argentina modifies Circular No. 2455 and states that future imports of mineral wax or ceresine (Tariff No. 4447) will be subject to special authorisation by the Ministry of Trade and Industry. Goods shipped up to 11 November 1956 and covered by irrevocable documentary credits still valid will be exempted from the provisions of this circular.

Circular No. 2673 transfers benzyl peroxide (in list of imports attached to circular 2305) from Tariff No. 4556 to Tariff No. 4268.

Canadian Plastics Exports

LAST YEAR Canada produced \$49.3 million worth of synthetic resins as against \$6.8 million in 1945, a seven-fold increase.

Exports of plastics raw materials constitute from one-quarter to one-third of total output. Sales abroad last year amounted to \$13.1 million dollars (more than half of it polystyrene) compared with \$1.4 million in 1945. Leading customers were: The UK, \$2.8 million; Hong Kong, \$1.7 million; France, \$1.6 million; the Netherlands, \$1.5 million; West Germany, \$933,000; Japan, \$879,000; and Australia, \$661,000.

Brazilian Refinery

PETROBRAS, the National Petroleum Co., of Brazil, is reported to be completing preliminary measures for the construction of a new oil refinery in Rio de Janeiro with a daily refinery capacity of 90,000 barrels. Daily production of the plant would be 1,300 barrels of liquefied gas, 22,500 barrels of petrol, 2,500 barrels of high-grade petrol, 14,400 barrels of paraffin, 16,400 barrels of diesel oil and 26,300 barrels of fuel oil.

Output at the Petrobrás refinery at Cubatão since early September has averaged 72,000 barrels a day.

Chrome in Rhodesia

SOUTHERN RHODESIA's mineral output is expected to be about £23 million by the end of 1956, according to Mr. C. J. Hatty, the Minister of Mines. Speaking of other metals Mr. Hatty said that Southern Rhodesia had the biggest deposits of metallurgical chrome in the world. Of nickel, lithium and the radioactive materials, Mr. Hatty declared that a greater knowledge of the deposits and of the methods of extraction were needed.

Salt Production

INDONESIA is reported to be negotiating the purchase of a further large quantity of salt from Thailand. A figure of 100,000 tons at US \$4.00 per ton for extended delivery has been quoted in press reports. The Thai Government are now seeking ways and means of increasing production and improving quality.

Corrosion Loss

Cost of Maintenance of Metal Installations Discussed

MEMBERS of the Institution of Civil Engineers in London on 29 November were told by Dr. W. H. J. Vernon that metallic corrosion is costing the UK £600 million a year. This sum only represented probable costs of maintenance of metal installations and the cost of equipment made unserviceable by corrosion. Indirect costs of breakdowns caused by corrosion were incalculable.

According to Dr. Vernon, the most common error was still that of joining together two dissimilar metals, or alloys without due consideration of their nature.

Care at the start of painting surfaces could significantly lengthen the intervals between repainting. One of the most promising methods of combating corrosion, he reported, was cathodic protection. It not only could prevent corrosion when installed from the beginning, but it could suppress leaks in bitumen-coated steel pipes. He quoted one instance where there had been 25 leaks over a period of seven years, each costing £500 to repair, including the cost of interruption of operations.

Dr. Vernon recommended that a corrosion research station, organised on a national basis, should be set up to tackle corrosion problems.

Training Food Scientists

A DEPARTMENT of Food Science was inaugurated on 30 November at the Royal College of Science and Technology (formerly Royal Technical College), Glasgow.

This development has been necessitated by the growth of the 50-year-old Scottish School of Bakery, whose superintendent, Professor James P. Todd, will control the department.

Laporte's New Plant

A LARGE-SCALE plant to manufacture hydrogen peroxide by an autoxidation process is being built by Laporte Chemicals Ltd. The plant should be operating early in 1958, according to Mr. D. H. Cutler, a director of Laporte.

It is understood that the plant will be sited at Warrington.

French Uranium Factory

A FACTORY for the chemical treatment of uranium is to be built at Bes-sines in the Haute Loire, France, where rich deposits of uranium ore have been located.

PHARMACOPŒIA FOR FOOD PRODUCTS

Nearly 700 Additives Available

A PLEA for a pharmacopœia for British food products on the lines of the *British Pharmacopœia* for drugs, was one of the suggestions made by Professor A. C. Frazer, Professor of Medical Biochemistry and Pharmacology in Birmingham University, when lecturing there to a one-day school on Food Technology and Health, on 1 December.

He said that in the US there were about 700 substances added to foods for technological reasons, and rather less than that number in this country.

Some of the uses of these additives were illustrated by samples on display. These included a plate of potatoes that had been allowed to discolour by exposure to the air, and a similar plate, peeled at the same time, whose whiteness had been preserved by immersion in a solution of 20 parts per million of sulphur dioxide.

The effect of an anti-rancidity additive to fats was also demonstrated. This had an importance relating to the outbreak of a disease in Hong Kong, which is thought to be caused by rancid fats.

Lecithin and Chocolate

Some simple experiments were presented which were designed to show how the addition of lecithin to chocolate in the liquid state changed its viscosity and gave it the right flow for easy control in manufacture.

In another experiment, an unnamed waxy sorbester was added to egg white, and the manner in which it interfered with the whipping properties was shown.

This line of research is of value in connection with the frothing capacity of beers and soft drinks.

Breads which had been treated with various additives were shown against a control sample, and in this way the effect of (1) glycerine monostearate 0.17 per cent, (2) acid calcium phosphate 0.35 per cent, (3) potassium bromate 10 p.p.m., (4) Vykamol, (5) milk powder and shortening, and a proprietary yeast food, were shown.

The use of calcium propionate in treating bread to prevent mould was explained, and also the use of gases and improvers for the purpose of giving bread better baking qualities, larger size, better texture, and later staling.

The lecturer said that agene-treated flour caused running fits in rabbits and dogs, but although no clear case of agene causing fits in humans had been recorded, he agreed with the wisdom of the ban on this treatment.

The professor paid a great deal of attention to the use of bread improvers, because this procedure touched the lives of so many people. The second place was given to a fairly full consideration of the hydrogenation of fats, and its importance in relation to the development of research on arteriosclerosis.

The fat deposited in the artery walls is cholesterol, and the relation of this deposit to the intake of various kinds of linoleic and stearic fats in the diet was explained.

The relation of the use of unsaturated fatty acids in pushing the cholesterol content of the arteries down, and in relation to the rate and amount of the deposits, was also considered.

The course closed with a comprehensive survey illustrated with lantern slides and charts of the range and purpose of the work of the food technologist, and the standard methods employed in a typical line of inquiry.

Employment

FIGURES relating to employment and wages in the chemical and allied industries are published in the November issue of the *Ministry of Labour Gazette*. For example 223,500 work-people received an estimated net amount of increase in weekly rates of wages of £111,700 during the 10-month period January to October. In the same period the aggregate number of working days lost in all stoppages in the industry was 6,000. The number of workers involved was 800. During October, four people in chemicals, oils, soaps etc. factories died from accidents in the course of their employment.

Battery Trucks

MATERIALS HANDLING by battery electric trucks at the Battersea (London) works of the Morgan Crucible Co. Ltd. is said to have resulted in a saving of £1,500 a year.

Use of battery trucks with suitable pallets has also speeded output and increased the company's storage.

List of British Standards

A SECTIONAL list of British Standards referring to chemicals, fats, oils, scientific apparatus etc. has now been published by the British Standards Institute, 2 Park Street, London W1. A short description of the contents of these standards is contained in the *British Standards Yearbook*.

by
Peter Cooper F.P.S.

Toxic Hazards in Industry

Part IV—GENERAL EFFECTS OF SOLVENTS

ABSORPTION of chemicals into the bloodstream and thus into the body tissues may take place by way of skin, alimentary canal or lungs. Of these routes, inhalation is the commonest way by which toxic solvents find entry and cause generalised reactions. As a rule, the type of poisoning is narcotic, since most solvents are readily taken up by lipoids in the cells, and depress the central nervous system either directly or after an initial period of stimulation. Acute poisoning by solvents is less common than chronic poisoning, since its onset is usually the result of accident, whereas chronic exposure may be unsuspected for a long time.

Acetone is one of the safest of solvents, and its high inflammability and relatively high cost work together to reduce the unnecessary exposure of workers to it. Acetone is moderately narcotic, producing early headache, followed by excitement and afterwards fatigue. Massive inhalations are suspected of causing some kidney and liver injury. The literature presents rather conflicting reports, and allowable concentrations for long periods have been estimated at anything from 200 to 1,500 p.p.m. The other ketones have received scant attention, but they may provisionally be regarded as slightly more toxic than acetone. Mild symptoms of poisoning are rapidly abolished if the patient is removed from further exposure. If a ketosis (acidosis) has been produced, rendering the patient comatose, sodium lactate may need to be given by vein or sodium bicarbonate by vein or mouth. Acetone is excreted as such in urine, and may be detected by the nitroprusside or salicylaldehyde tests. (Diabetic states may also give a positive for acetone.)

Benzene

Benzene is one of the most dangerous solvents known. Its safety-level is in the region of 50 p.p.m. The fire danger usually militates against unnecessary exposure, but benzene is a common ingredient of paint-removers, degreasers and rubber-solvents and its presence may be unrecognised. The main danger of benzene lies in its progressive destruction of bone-marrow. Once this has been damaged, removal from further exposure may have no effect in arresting a fatal deterioration, latent but killing the victim after many symptomless years.

Early signs of benzene poisoning are not impressive—nausea, headache, dizziness and disturbances of gait. Later, the destruction of red cells and the diminished production of them in bone-marrow produces an anaemia. There is also a serious drop in the number of circulating white blood-cells (leucopenia). A low red-cell count is usually considered a more reliable danger signal than leucopenia. Mild haemorrhages

(e.g. nose-bleeding) are often the first sign of blood changes. As remedial measures, blood-transfusions, large doses of ascorbic acid, and antibiotics to combat the increased liability to infection have been employed. Exposure to benzene is considered unjustifiable for persons with haematological abnormalities, and is inadvisable for persons under 18 years.

Toluene is less toxic than benzene, and the toxicity of xylene is suspected to stem from its contamination with benzene. In benzene intoxication the urine contains phenol and *p*-aminophenol, which give a red-purple colour with ferric chloride.

Carbon Disulphide

Carbon disulphide produces fatigue, nausea and vomiting, headache, constipation, visual disturbances and an inability to concentrate. These effects follow exposure to about 150 p.p.m. Concentrations above 10 p.p.m. are probably toxic over long periods. Carbon disulphide causes severe vascular changes, and definitely increases liability to gastric or duodenal ulceration. At higher concentrations (say 500 p.p.m.), mental symptoms may develop while depression or excitement may lead to maniacal episodes, and if exposure is continued, to irreversible mental deterioration. Very high doses produce death with convulsions. Removal from further exposure is essential, and in severe cases oxygen inhalations may be given, with sedatives to combat the excitement.

Carbon disulphide appears in the urine, and gives a grey precipitate when it is boiled with Fehling's reagent. Part is oxidised, and the urinary sulphates rise accordingly.

Chlorinated hydrocarbon solvents are all very narcotic, and act as general anaesthetics; their most dangerous action is a delayed action on liver and kidneys. Tetrachloroethane is the most toxic, tetrachloroethylene the least toxic of the series. All the compounds are liable to become drugs of addiction in certain individuals.

Carbon tetrachloride is not so narcotic as chloroform, but its after-effects are far more toxic. Chronic alcoholism enhances the effects of it on the liver and kidneys, and should be regarded as a contra-indication to exposure. High concentrations of carbon tetrachloride cause headache, confusion and dizziness, followed by unconsciousness and respiratory failure. Moderate exposure (say 500 p.p.m.) induces headache with nausea and vomiting (sometimes haemorrhagic), with abdominal colic and perhaps constipation. Exposure to more than 50 p.p.m. is unwise. The prominent symptoms of poisoning are referred to the central nervous system and its depression.

Toxic Hazards in Industry

Acute poisoning may also follow the application of carbon tetrachloride to the skin, which, in suspected cases, should be washed with soap and water. After exposure, fresh air and a high carbohydrate-protein, low fat diet with added vitamin B-complex and glucose are indicated. Opinions differ over the relative value of either high-fluid intake or fluid-restriction measures.

Trichloroethylene

Trichloroethylene produces an euphoric inebriation which proceeds through somnolence to headache and narcosis. Discontinuing the exposure results in sleeplessness, so that deliberate inhalation may be practised at bedtime. The neurological complications which follow acute exposure to trichloroethylene may last for as long as three months. The solubility of the compound in fats explains why exposure to it may cause an intolerance to milk, which exacerbates the symptoms. The mental symptoms of which the victim complains are predominantly subjective.

During trichloroethylene intoxication trichloro- and monochloro-acetates, with other conjugated compounds, appear in the urine; trichloroacetic acid levels exceeding 20 mg. per litre suggest poisoning. Working concentrations of 500 p.p.m. or more are hazardous. The more serious results of poisoning, trigeminal paralysis and optic nerve atrophy, probably derive from the impurities in the commercial solvent.

Methanol

Methanol, because of its relatively low boiling-point and its cumulative action, is the only common alcoholic solvent to be feared at ordinary temperatures. Exposure to more than 300 p.p.m. is definitely hazardous if maintained over a long period. Methanol produces headache, vertigo, ringing in the ears and visual disturbances, with gastric upsets, muscular twitchings and a sense of oppression of the chest. Mania and blindness, which may become irreversible, follow continued exposure to the vapour. Methyl acetate has similar effects. Aneurine hydrochloride (vitamin B₁₂) is used to counter the optic nerve degeneration. Recovery, where it occurs, may be extremely slow. Methanol is oxidised in the body, and formic acid levels in the urine serve to assess the degree of poisoning.

NOTE: Threshold limit values differing from those quoted in the text have been published by the ACGIH. Committee of the American Medical Association (*Arch. Industr. Hyg.*, 1953, **8**, 296). They represent an extremely cautious estimate, and are not universally agreed elsewhere in the literature. Estimates of this nature are to be taken as a guide rather than a rule. The relevant figures are: Acetone, 1,000 p.p.m.; benzene, 35 p.p.m.; carbon disulphide, 20 p.p.m.; carbon tetrachloride, 25 p.p.m.; trichloroethylene, 100 p.p.m.; methanol, 200 p.p.m.

REFERENCES

- Adams, *et al.*, *Arch. industr. Hyg.*, 1952, **6**, 50.
 Ahlmark & Forssman, *ibid.*, 1951, **3**, 386.
 Browning, *MRC Industr. Hlth. Res. Brd. Rep.*, 1953, No. 80.
 Council on Industrial Health, *J. Amer. med. Ass.*, 1946, **132**, 786.
 Hamilton & Hardy, *Industrial Toxicology*, 2nd edn. NY, 1949.
 Kleinfeld & Tabershaw, *J. Amer. med. Ass.*, 1955, **159**, 677.
 Leaf & Zatman, *Brit. J. Industr. Med.*, 1952, **9**, 19.
 Rowe, *et al.*, *Arch. industr. Hyg.*, 1952, **5**, 566.
 Vyskocil, *Lek. Listy*, 1953, **8**, 269.
 Wilson, *J. Amer. med. Ass.*, 1949, **139**, 906.

DIAPHRAGM COMPRESSORS

French Equipment Available in UK

DESIGNED for handling pure, dangerous or corrosive gases and liquids, the diaphragm compressors made by Corblin of Paris are now available in the UK through CT (London) Ltd., 27 Ashley Place, London SW1.

The compressor consists essentially of two thick circular plates one face of each of which is concave. The two plates are bolted together with the concave faces inwards and a flexible metal diaphragm is clamped between them. Pumping is provided by filling the lower chamber with oil in communication with a pump chamber. A piston reciprocates in the oil, producing an oscillating movement of the diaphragm. This movement produces the pumping action.

Opportunities for Graduates

OPPORTUNITIES existing for graduates in the Albright & Wilson and Midland Silicones organisation are described in an attractively produced booklet *Careers for Graduates*. Useful information about the organisation, its history and present-day activities are included. Feature of the booklet is the series of scale maps showing the location of the various works and the surrounding districts. There are notes about educational facilities, housing and general amenities. Though the booklet chiefly concerns those with a degree in chemistry or chemical engineering, it also refers to graduates in mechanical engineering and in arts subjects. Opportunities also exist in the organisation, from time to time, for those qualified in electrical engineering or in textile or rubber technology.

Heat Exchangers Save Power

HEAT previously lost in the Ardeer pressure oxidation nitric acid plant of Imperial Chemical Industries is now being recovered and transformed into electrical energy.

In the process ammonia gas is mixed with heated compressed air and the mixture is passed over a platinum-rhodium catalyst. The hot gases are then cooled to normal temperature when a further reaction takes place and a mixture of nitrogen and oxides of nitrogen is formed.

This gas is passed to an absorption tower where the oxides of nitrogen are dissolved to form nitric acid and the inert nitrogen hitherto passed to the atmosphere at a pressure of 85 lb. per sq. in. is fed back to the circuit.

In the old system only one heat exchanger was needed to raise the temperature of the compressed air as it passed to the mixer. Two more heat exchangers have now been built in the circuit.

The hot reaction gases are piped through these exchangers as they pass to the cooling system before coming to the reaction tower. Instead of being released to the atmosphere the waste gases are led through the two new heat exchangers and are heated by the reaction gases. As a result the temperature is raised to 650°C.

The heated waste gases are used to operate a turbo-alternator. It is estimated that 70 per cent of the power needed by the compressor is supplied in this way.

Steel v Plastics

World Moves in Link-up for Pipe Manufacture

A RECENT German comment on steel production is of interest. In spite of improved production methods, it is suggested that there has been no marked rise in steel output. Labour difficulties, such as strikes in the US, have produced noticeable declines in output. It is considered, therefore, that in the future, steel output may well continue to decline owing to the increased production of substitution products. Even today this can be seen in the drop in output of the steel pipe industry.

A world famous steel pipe producer, Bündnisse, recently united with a chemical works in order to be in contact with plastic pipe production. The American company, Youngstown Sheet & Tube Co., has secured an interest in the Fibreglass Corporation. Likewise the American Republic Steel Corporation has started a plastics pipes division, as have the National Tube Division of the United States Steel Corporation and Jones & Laughlin.

In England, Tube Investments has set up a subsidiary company—Tube Investments (Plastics) Ltd. In the Federal Republic the Rheinischen Tube works and the Rhenish-Westphalian iron and steelworks have entered the chemical field with the object of producing plastics pipes.

Price Changes

FROM 1 DECEMBER 1956 the price for Chilean refined granulated nitrate of soda, over 98 per cent, in lots of six tons or more delivered carriage paid to any railway station in Great Britain is £29 10s net per ton of 2,240 lb. gross weight.

Smaller lots delivered carriage paid are subject to the following surcharges:

	per ton
4 tons and over, but less than 6 tons	5s. 0d.
2 " " " " 4 " "	10s. 0d.
1 ton " " " " 2 " "	20s. 0d.
	per cwt.
5 cwt. and over, but less than 1 ton	1s. 6d.
Less than 5 cwt.	2s. 6d.

Bursting Discs

MARSTON EXCELSIOR LTD., a subsidiary of Imperial Chemical Industries Ltd., has taken over from ICI's Billingham division the manufacture of burstings discs—safety devices which can be used in pressure systems and which burst if a given pressure is exceeded. The firm is now prepared to meet increased demands for these items of equipment. It is also producing carriers and vacuum supports to hold the discs in position.

OBITUARY

MR. W. S. NAYLOR, chairman of the Chloride Electrical Storage Co. Ltd. from December 1929 until July 1946, died at his home in Lytham St. Annes last week, at the age of 82. Appointed assistant manager to the Chloride Co. in 1902, Mr. Naylor became general manager four years later. In 1921 he joined the board of directors, becoming chairman and joint managing director in 1929. Although he retired from executive duties in March 1933, Mr. Naylor remained chairman of the company until 1946.

MONSIEUR JEAN EDMOND GERARD, director general of the Société de Productions Documentaires, Paris, France, died on 28 November after a short illness. He was also secretary-general of the European Federation of Chemical Engineers, and vice-president delegate of the Société de Chimie Industrielle. In 1929 M. Gerard was made a Chevalier of the Legion of Honour.

Freeze Driers

TWO BOOKLETS describing freeze driers have been published by Edwards High Vacuum Ltd. General booklet E203/1 describes the range of driers and associated plant, from the small L5 unit for research work to the large model 51 production machines. Leaflet E186/3 provides full information on one of the most widely used models, the 30P.

Nickel Plating

ENGINEERS, designers and others who are interested in the possibilities which plating offers in design, will be interested in *Nickel Plating for Engineers*, a new 72-page booklet issued by the Mond Nickel Co. Ltd.

No attempt has been made to cover plating procedures in great detail, but practices have been dealt with in so far as they affect the properties of the resultant deposits. The text includes a description of surface preparation in general and for zinc-base alloys, aluminium and nickel-chromium-iron alloys in particular.

Commonly used solutions, relevant plating procedures to maintain high quality work, plant required, mechanical properties of deposits and methods of testing deposits are all dealt with in a highly compressed text. A good deal of information is given in the form of graphs or tables for quick reference.

Copies of the publication are obtainable free of charge from the company at Thames House, Millbank, London SW1.

Profits Fall

Staveley Group Attribute This to Rising Costs

TOTAL earnings of the Staveley group of companies fell to £1,745,886 for the year ended 30 June 1956, compared with £1,763,826 for the previous year. According to the chairman in his annual statement to shareholders this is due to a reduction in profit margins caused among other things by rising costs for labour and materials.

Net profit after tax was £1,007,108, of which 58 per cent was absorbed by dividends, leaving 42 per cent retained in the business. An interim dividend of 4½ per cent was paid in March and a final dividend of 10½ per cent was recommended by the directors, making 15 per cent for the year. Considerable reorganisation has taken place in the Birmingham Chemical Co., a Staveley subsidiary. As a result, said the chairman, there are indications that the company is making progress. Better profits than a year ago have been reported for the British Soda Co. Recent expenditure on plant has shown satisfactory results.

Visit to USSR

THE THREE members of the British Plastics Federation who recently visited the USSR (see THE CHEMICAL AGE, 3 November, page 211, and 10 November, page 249) have now made their report, a copy of which has been circulated to all members of the Federation.

In a tour lasting from 12 to 31 October the party saw eight plastics factories in and around Moscow and Leningrad, together with the Institute of Polymeric Plastic at Leningrad.

At the conclusion of their tour they discussed what they had seen with Russian government officials. They said that they had seen very little, if any, British plant or equipment, and asked whether it was Russia's intention to consider purchasing from the British plastics industry. The reply was that Russia did intend to buy from Britain, but that the usual commercial considerations, price, quality, delivery etc., would operate.

Industrial Flooring

MANY advantages are claimed for Hexmetal industrial flooring. It is said to be a fabrication of steel walled honeycomb cells which when loaded with a filler acts as a binder and as a separator. It absorbs impact load and vibrations and inhibits cracking.

Causeway Reinforcement Ltd., 66 Victoria Street, London SW1, makes Hexmetal flooring.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.

COMMERCIAL PLASTICS LTD., Wallsend-on-Tyne. 6 November, deed of substitution (supplemental to a mortgage dated 27 June 1951), to Atlas Assurance Co. Ltd., securing £37,500 balance owing on said mortgage; charged on two pieces of land at Stephenson Street, Willington Quay, Wallsend-on-Tyne, with buildings thereon. *£37,500 balance of mortgage and £210,000 unsecured convertible loan stock. 24 August 1956.

PORTLAND PLASTICS LTD., Hythe (Kent). 7 November, debenture to Bowmaker Ltd. securing all moneys due or to become due from the company to the holders; charged on specified plant, equipment and machinery. *£6,750. 15 March 1956.

New Registrations

YDC Pension Trust Ltd.

(575,282.) Registered 6 December as a company limited by guarantee without share capital. The original number of members is 50, each being liable for £1 in the event of winding up. Objects: To receive and hold all or any of the investments and other property of the pension trust funds of the Yorkshire Dyeware & Chemical Co. Ltd., or its associated or subsidiary companies, etc. The income and property of the trust whencesoever derived, shall be applied solely towards the promotion of its objects. The management is vested in a council, the

first members of which are: Francis A. Helme, Glenholme, 75 Hookstone Drive, Harrogate; Harry Wiles, 21 Grove Road, Halton, Leeds; and Lawrence L. Bedford, Woodland View, Bachelor Lane, Horsforth, Leeds. Secretary: P. Trevelyan. Solicitors: Ford & Warren, Leeds. Registered office: 24 Lower Basinghall Street, Leeds.

Supranimal Ltd.

Private company (575,105). Registered 3 December. Capital £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in medicine whether patented or not, particularly those known or intended to be known as Supranimal and any by-products thereof, etc. The subscribers (each with one share) are: L. Roberts, 14 Castle Drive, Horley, Surrey, accountant cashier; Thomas R. Mealing, 15 The Fairway, London W3, solicitor's clerk. The first directors are to be appointed by the subscribers. Solicitors: Leslie Nathanson & Co., 22 Manchester Square, London W1.

G. E. Newman Ltd.

Private company (575,081). Registered 3 December. Capital £1,000 in £1 shares. Objects: To carry on the business of manufacturing, pharmaceutical, analytical, photographic, advising and dispensing chemists and druggists, etc. The permanent directors are: George E. Newman, High Street, Westham, Pevensey, Sussex; and William J. Redman and Mrs. Florence A. Redman, both of Oaklands, Chipping Hill, Witham, Essex. Secretary: C. A. Goddard. Solicitors: Bawtree & Sons, Witham. Registered office: 15 Chipping Hill, Witham, Essex.

Vacuum Salt Ltd.

Private company (575,168). Registered 4 December. Capital £100 in £1 shares. Objects: To carry on the business of salt mine proprietors and miners, brine owners and pumpers and manufacturers of and dealers in mineral and chemical products of all kinds, etc. The subscribers (each with one share) are: J. E. Phillips, solicitor's managing clerk; and Peter F. Ralfs, solicitor, both of 11 Old Jewry, London EC2. The first directors are not named. Solicitors: Clifford-Turner & Co., 11 Old Jewry, London EC2.

MARKET REPORTS

LONDON The overall demand for industrial chemicals has settled down to normal requirements for the period with buyers giving attention to contract replacements. Export trade enquiries have been fairly numerous chiefly for Commonwealth destinations. The impact of the higher cost of petrol and other hydrocarbon oils was mentioned in last week's issue and, while most sections of the market have behaved steadily enough, it remains to be seen whether increased costs will be absorbed in the existing price levels. This view is held by many who see the markets becoming increasingly competitive. The decline in metal prices has again reduced the basis quotations for dry white lead and red lead to £146 10s and £141 10s per ton respectively as from 11 December. The call for fertilisers continues on a moderate scale with the demand for basic slag a feature. A steady trade is reported on the coal-tar products market and there has been a fair demand for the xylyls and toluols at the higher rates now ruling.

MANCHESTER It is difficult to gauge at this stage the exact effect of the rise in transport charges on production costs in the chemical industry, though it is generally appreciated that it must have a further strengthening influence on prices. Meanwhile, a steady call for deliveries of the heavy products has been reported this week from home consumers, with a fair enquiry from shippers. Apart from basic slag and a few other lines, which are in good request, demand for fertiliser materials is described as moderate. Most of the light and heavy tar products are moving steadily into consumption.

GLASGOW Business generally has been very brisk during the past week in the Scottish heavy chemical market, both in regard to spot and contract deliveries. Prices meantime continue fairly steady, but the recent announcements of increases in petrol and oil will no doubt have their repercussions. Fertilisers continue steady in keeping with seasonal demands.

Tyre Prices Up

PRICES of all types of Dunlop tyres were increased by 10 per cent on Thursday 6 December. The increase is due to rising costs of production brought about particularly by the increased price of rubber, states the company.



Headaches from Emulsion breaking?

Sequestrol (ethylene diamine tetra-acetic acid Geigy) completely inhibits the action of polyvalent metal ions such as those of calcium, aluminium, iron, etc., which so often cause instability in oil-in-water emulsions. Also, by its solubilising action on many inorganic substances in aqueous suspension, Sequestrol can reduce the tendency to emulsion breaking by large particles. Enquiries are welcomed.

*A pinch of
SEQUESTROL
may be the
answer*

THE GEIGY COMPANY LTD., Rhodes, Middleton



MANCHESTER

PATENTS

By permission of the Controller of HM Stationery Office the following extracts are reproduced from the Official Journal (Patents). Copies of this publication may be obtained from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d per copy (including postage); annual subscription £6 6s. The letter P or C preceding the number indicates that the application was accompanied by a provisional specification or a complete specification respectively.

APPLICATIONS

- P33394 Nuclear reactors. AEI-J. Thompson Nuclear Energy Co. Ltd.
- C33380 Gaseous medium maintaining apparatus. Aktiebolaget Svenska Flakfabriken.
- C33080 Airflow conveying system. Aktiebolaget Westin & Backlund.
- P33355 Milk gelling. Albright & Wilson Ltd.
- C32899 Aluminium &c. corrosion-resistant coatings. American Chemical Paint Co.
- C32782 Fatty acids decarboxylation. Armour & Co.
- C32783 Fatty acids catalytic decarboxylation. Armour & Co.
- C32784 Elastase. Armour & Co.
- C33407 Cysteine hydrochloride. Aschaffenburg Zellstoffwerke AG.
- P32735 Halogenated hydrocarbons. Associated Ethyl Co. Ltd.
- C32935 High temperature &c. heater. Babcock & Wilcox Co.
- C32936 Liquid heating apparatus. Babcock & Wilcox Co.
- C33365 Vapour generating &c. Babcock & Wilcox Co.
- C33347 Olefinically unsaturated hydrocarbons polymerisation products. Badische Anilin- & Soda-Fabrik AG.
- C33201 Polymerised N-vinyl lactams &c. preparation process. Badische Anilin- & Soda-Fabrik AG.
- C32940 Bituminous batch plants. Barber-Greene Co.
- C33107 Esteramides manufacturing processes. Beck & Co., Ges.
- P33054 Heat exchanger tubing. Birmetals Ltd.
- P32839 Fluids discharge pressures controlling devices. Boore, W. H.
- P33047 Gases presence detecting apparatus. Bransby, B.
- P32903 Luminescent materials. British Thomson-Houston Co. Ltd.
- P33227 Reactor feed method &c. British Titan Products Co. Ltd.
- P33161 Sheep dip. Brittain, G. T.
- C32693 Rengenerated cellulose filamentary material. Celanese Corporation of America.
- C33363—C33364 Polyesters. Celanese Corporation of America.
- C32650 Chlorination process. Chempatents, Inc.
- C33004 1,3,5 triazine compound manufacturing process. Ciba Ltd.
- P33113 Ascorbic acids. Coleby, B.
- C33212 Starch conversion liquors dehydrating process. Corn Products Refining Co.
- P33200 Textile fabrics treatment. Courtaulds Ltd.
- C33268 Plastic compositions. Diamond Alkali Co.
- C33343 Chemical composition. Douglas, J. F., and Gaughran, E. R. L.
- C33135—C33291—C33422 Magnesium alloy. Dow Chemical Co.
- P33102 Horticultural pest control agents. Duddington, C. L., and Lumb, M.
- P33164 Polymers modification. Du Pont Co. of Canada Ltd.
- C32637 Resinous compositions. Du Pont de Nemours & Co., E. I.
- C32803 Regenerated cellulose structures. Du Pont de Nemours & Co., E. I.
- C32973 Laminated structures. Du Pont de Nemours & Co., E. I.
- G33288 Regenerated cellulose articles. Du Pont de Nemours & Co., E. I.

- C33287 Hydrocarbons purification. D-X Sunray Oil Co.
- C32990 Heparin derivatives. Erba Soc.
- C33090 Fluid coking stripping. Esso Research & Engineering Co.
- P33124 Acylamino-carboxylic acid amides. Ciba Ltd.
- C32913 Batch weighers. Fairbanks, Morse & Co.
- C32774 Polysaccharides degrading &c. method. Farbenfabriken Bayer AG.
- C32964 Thiol-phosphoric acid esters. Farbenfabriken Bayer AG.
- C32808 Perfluorechloro-paraffins process. Farbwerke Hoechst AG.
- C33001 Plastic film. Farbwerke Hoechst AG.
- C33002 Pipes stabilising method. Farbwerke Hoechst AG.
- P32938 Gases purification. Gas Council.
- C32685 Chemical nickel. General American Transportation Corp.
- P33091 Lubricating composition. Gibson, J. A., Morton, R. W. and Osborn, P. M.
- P32738 Hecogenin esters purification process. Glaxo Laboratories Ltd.
- P32662 Strontium separating method. Glueckauf, E.
- C33214 Elastomeric polymers aqueous dispersions. Goodrich Co., B.F.

ACCEPTANCES

Applications in the following list, and the specifications filed in pursuance thereof, will be open to public inspection in due course. Persons interested may give notice of opposition to the grant of a Patent on any of the applications included in the list by filing Patents Form number 12 at any time within the prescribed period.

- 765 551 Manufacture of polysiloxane condensation products. Wacker Ges. Für Elektro-chemische Industrie, Dr. A.
- 765 334 Distillation process for separating ethyl acetate from liquid mixtures. Wacker Ges. Für Elektro-chemische Industrie Ges.
- 765 553 Lubricating oil additive. Esso Research & Engineering Co.
- 765 673 Purification of gases containing hydrogen sulphide. Pauling, H.
- 765 674 Fluorescent coating compositions. British Thomson-Houston Co. Ltd.
- 765 335 Production of derivatives of vat dyes and the dyeing of non-cellulosic textile materials therewith. Hardman & Holden Ltd.
- 765 740 Production of fibres of acetyl-cellulose or of linear polyamides or polyurethanes dyeings fast to cross-dyeing. Farbwerke Hoechst AG.
- 765 560 Alcohols from unsaturated compounds. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
- 765 459 Sulphur containing compounds. Boots Pure Drug Co. Ltd.
- 765 742 Production of tricyclodecane-dimethylal and its derivatives. Ruhrchemie AG.
- 765 743 Molecular distillation apparatus. Vitamins Ltd.
- 765 464 Magnetizable iron oxides. Electric & Musical Industries Ltd.
- 765 564 Producing melamine. Soc. Des Produits Azotes.
- 765 468 Production of alumina/silica catalysts. Imperial Chemical Industries Ltd.
- 765 469 Separating benzene hydrocarbons and naphthalene from gases containing same. Koppers Ges., H.
- 765 566 Artificial flavouring substances and their preparation. Unilever Ltd.
- 765 221 Regeneration of platinum or palladium catalysts. Esso Research & Engineering Co.
- 765 744 Polymerisation of substantially diorgano-substituted siloxanes. Wacker-chemie Ges.
- 765 745 Polyisocyanate modified polyesters and polyesteramides. Imperial Chemical Industries Ltd.
- 765 475 Grease compositions containing lithium and calcium soaps. Esso Research & Engineering Co.
- 765 477 Mono-ethers of sorbital and their preparation. Atlas Powder Co.
- 765 478 Process and apparatus for purifying heavy fuel oils. Westfalia Separator AG.

"When we published our essay on the Nomenclature of Chemistry, we were reproached for having changed the language which was spoken by our masters, which they stamped with their authority, and have handed down to us. But those who reproach us on this account, have forgotten that Bergman and Macquer urged us to make this reformation: In a letter which the learned Professor of Upsal, M. Bergman, wrote, a short time before he died, to Mr. Morveau, he bids him 'spare no improper names; those who are learned, will always be learned, and those who are ignorant will thus learn sooner'."



(Lavoisier—'Elements of Chemistry in a New Systematic Order Containing All the Modern Discoveries', translated from the French by Robert Kerr, 3rd Edition, 1796.)

'spare no improper names'

The nomenclature of chemistry is being reformed still. The Chemical Society, the British Standards Institution, the Association of British Chemical Manufacturers and other bodies lead the way along the path of reformation and a new and much enlarged catalogue of B.D.H. laboratory chemicals that has just been published seeks to follow. This bigger and better catalogue contains over six thousand products and gives formulæ and molecular weights for most of them, as well as quoting a great many specifications of minimum purity. It is also liberally provided with cross-references—for sooner learning.

B.D.H. LABORATORY CHEMICALS

THE BRITISH DRUG HOUSES LTD, B.D.H. LABORATORY CHEMICALS GROUP POOLE DORSET

LC/P/14v.

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to mid-day Tuesday for insertion same week.

SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of THE CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of THE CHEMICAL AGE YEAR BOOK.

COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

OFFICIAL APPOINTMENTS

NORTH THAMES GAS BOARD

CHEMISTS AND PHYSICISTS holding University degrees are required in the Laboratories at **WATSON HOUSE, FULHAM, S.W.6**, to undertake research work on the utilisation and design of domestic and industrial gas and coke appliances, particularly on cookers, water heaters, gas and coke fires, refrigerators and industrial apparatus.

The Laboratories have recently been modernised and extended and are responsible for research work for the Gas Industry throughout the country.

The appointments will be permanent and pensionable and the starting salary will be within the range of £680-£900 per annum according to age, qualifications and experience.

Applications should be sent to the **STAFF CONTROLLER, NORTH THAMES GAS BOARD, 30 KENSINGTON CHURCH STREET, W.8**, quoting reference No. 666/280, to reach him within ten days of the appearance of this advertisement.

RESEARCH STUDENTSHIP

UNIVERSITY COLLEGE OF NORTH STAFFORDSHIRE POLYMER CORPORATION RESEARCH STUDENTSHIP

Applications are invited for the second tenure of this Studentship from graduates having a good Honours Degree in Chemistry or in Honours General Science (including Chemistry). The successful applicant will be expected to register for a higher degree, working on cationic polymerisation under the direction of Dr. P. H. Plesch.

The appointment will be for not more than 2 years in the first instance, but may be extended. The stipend will depend on age and qualifications, but will not be less than £350 p.a.

Applications giving a brief curriculum vitae and the names of two referees, should reach the Registrar, The College, Keele, Staffs., not later than the 12th January, 1957.

SITUATIONS VACANT

ASSISTANT CHIEF WORKS CHEMIST.—Graduate or A.R.I.C. standard or someone in course of qualifying. Some experience of tar works practice is preferable. This is a progressive post for a keen young man with the right personality. Salary commensurate with age, experience and qualifications. Write to **SOUTH WESTERN TAR DISTILLERIES, ELING HOUSE, TOTTON, SOUTHAMPTON.**

CHEMIST, Graduate or A.R.I.C. required for **RESEARCH LABORATORY.** Duties involve development and improvement of manufacturing processes for fine chemicals. Industrial experience an advantage but not essential. Applications should be made to the **PERSONNEL OFFICER, HOPKIN & WILLIAMS LTD., FRESHWATER ROAD, CHADWELL HEATH, ESSEX.**

SITUATIONS VACANT: continued

COLOUR CHEMIST required for London Printing Works. Must have experience in Gravure & Aniline Inks. Commencing salary £1,500 per annum. Apply **BOX No. C.A. 3511, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SHELL CHEMICAL COMPANY LIMITED

has vacancies in various centres in the UK for

CHEMISTS

for interesting work in different fields, including research, product development, technical service and marketing. Applicants should preferably be males, not more than 32, and hold a Diploma or Degree in Chemistry, or equivalent qualifications.

Previous laboratory or commercial experience desirable but not essential.

Excellent prospects, generous pension scheme and other benefits. Salaries according to age, qualifications and experience.

Write, with full details, to **Shell Chemical Company Limited, Personnel Department, 170, Piccadilly, London, W.1.**

FOR SALE

600 FURNACES

Rotary Oil-fired FURNACE by Stein & Atkinson. M.S. construction; 8 ft. on straight; 50 in. outside diam.; conical ends 20 in. and 14 in. long. Furnace lined manganese bricks fitted retractable doors. Mounted on roller paths and motorised 400/3/50. Wallsend Slipway Burner, working temperature 210° F. With Alcosa Fan, Cyclone, Ducting and two C.I. Slag Pots.

OVEN by Laboratory Thermal Equipment. Thermostatic control at 105° C. with maximum 250° C. Fitted two shelves 18 in. by 19½ in. with racks available for 5 shelves. Loading, 2,250 watts, for operation on 100/110/1/50. With transformer.

Six Vacuum DRYING OVENS by Scott. C.I. construction; internal dimensions approximately 6 ft. by 4 ft. 3 in. by 4 ft. 6 in., with steam coil sheels for trays. Suitable 27-28 in. vacuum. Fitted slide rail door. Horizontal Vacuum Pump.

ROTARY OIL-FIRED FURNACE—13 ft. by 4 ft. diam., one dished end, one conical charge end 24 in. deep M.S. construction. Mounted on two roller paths and driven by 10 h.p. motor 400/3/50 by chain through reduction gear. Accessories are motorised. Alcosa Fan, 3 C.I. Slag Pots, Cyclones and Ducting.

GEORGE COHEN SONS & CO. LTD.,

WOOD LANE, LONDON, W.12.

Tel.: Shepherds Bush 2070 and

STANNINGLEY, NR. LEEDS.

Tel.: Pudsey 2241.

FOR SALE: continued

MORTON, SON AND WARD, LIMITED, STAINLESS STEEL VESSELS

VESSELS of all shapes and sizes, jacketed or unjacketed—with stainless steel mixing gear to requirements; also stainless steel storage tanks and vacuum vessels.

"MORWOOD" "U"-shaped TROUGH MIXERS—up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.

Stainless Steel TROUGHS, TANKS and CYLINDERS made to requirements.

These items can also be fabricated in mild steel.

JACKETED PANS

100g., 150g., and 200g., new, in mild steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.

3 cwt. TROUGH MIXERS by CHALMERS and GARDNER—stainless steel-lined troughs.

50g., 75g. and 100g. heavy duty MIXERS by FALLOWS and BATES. Agitators driven through bevel gears from fast and loose pulley.

200g. cast-iron JACKETED MIXING VESSEL with nickel-chrome impeller type agitator driven through bevel gears from fast and loose pulley.

BROADBENT HYDRO EXTRACTORS

21 in. EQUAL TO NEW, galvanized baskets, electrically driven through centrifugal clutch or belt driven. Safety inter-locks.

AIR COMPRESSORS

THREE 30 c.f.m. at 100 lb. pressure, water cooled, automatic overloads, with or without motors.

AIR RECEIVERS MADE TO REQUIREMENTS PUMPS

Selection of new MONO and second-hand Pumps in stock—2 in. to 5 in.

Inquiries Invited.

MORTON, SON AND WARD, LIMITED,
WALK MILL,

DOBCROSS, NEAR OLDHAM,
Lancs.

Phone Saddleworth 437

PHONE 98 STAINES**STAINLESS STEEL PLANT**

S.S. "GARDNER" SIFTER/MIXER—40 in. by 17 in. by 17 in.

S.S. AUTOCLAVES—6 ft. by 3 ft., 100 w.p. (Three.).

S.S. 100-gal. JACKETED PAN AND MIXERS.

S.S. TIPPING PANS—65 gallons (Two).

S.S. ENCLOSED ELEVATOR—40 ft. centres.

S.S. 30-gal. GAS-HEATED PAN.

S.S. 40-gal. OPEN PAN.

S.S. and Chrome EMULSIFIER/MIXING ARMS—A.C.

S.S. LARGE SINK UNITS—3 ft. by 2 ft. by 1 ft. 3 in. (Two.)

TANKS, PANS, PUMPS, CONDENSERS, CALORIFIERS,

STILLS, HYDROS, REFINERS, all types of MIXERS.

Send for Lists.

HARRY H. GARDAM & CO., LTD.

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural, burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3. (TELEPHONE: EAST 3285).**

MOISTURE TEST—THREE MINUTES—Already in use in many industries where rapid determination of water content of chemicals, colours, glazes and other raw materials is essential. "SPEEDY" MOISTURE TESTER has proved accurate and invaluable. Portable, needs no electricity, no skill. Complete £27 10 0. Order direct or send for illustrated leaflet to (Dept. C.A. 6) **THOS. ASHWORTH & CO. LTD., Vulcan Works, Burnley, Lancs.**

TILTING "U"-TROUGH MIXER—4 ft. long by 1 ft. 6 in. by 2 ft. deep. Agitator shaft has 12 mixing paddles. Renold chain-drive. **WINKWORTH MACHINERY, LTD., 65, HIGH STREET, STAINES.** Telephone: 1010.

FOR SALE: continued

FINE GROUND MAGNESIAN LIMESTONE

90 per cent passing 200 mesh.

For samples and price, apply to:

THE BRICK MARKETING COMPANY, LIMITED,
NORTH BRIDGE ROAD,
DONCASTER.

HARRISON CARTER 5 ft. EDGE RUNNER MILL, with granite bed and rolls 2 ft. 6 in. diam. by 8½ in. fall. With reduction drive gear and 6 h.p. motor for 400/3/50. Excellent condition. **F. J. EDWARDS LTD., 359 EUSTON ROAD, LONDON, N.W.1.**

MIXERS—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in. Fast and loose pulleys and clutch. "Z" blades.

1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in. Pulley drive and clutch. Four "L" blades.

THOMPSON & SON (MILLWALL), LTD.,

LONDON, E.14.

TEL.: EAST 1844

INVITATION TO TENDER

THE BOARD OF TRADE has for disposal approximately 60,608 tons of **PYRITES** in six Lots, as follows:—

Ex store at Padiham, near Burnley, Lancs.

Lot 1.—Approx. 24,723 tons Rio Tinto/Tharsis, arsenical fines.

Lot 2.—Approx. 6,012 tons Kalavassos, non-arsenical fines.

Lot 3.—Approx. 1,280 tons Skorovas, non-arsenical fines.

Ex store at Pyewipe, Grimsby, Lincs.

Lot 4.—Approx. 10,085 tons Waite Amulet, non-arsenical concentrates.

Lot 5.—Approx. 8,383 tons C.M.C. non-arsenical concentrates.

Lot 6.—Approx. 10,125 tons C.M.C. non-arsenical concentrates.

Full particulars and Forms of Tender (returnable by January 8th, 1957) may be obtained on application to the Board of Trade, C. & G. 7(b), Room 301, Lacon House, Theobalds Road, London, W.C.1. (Telephone No.: Chancery 4411, Extension 295 or 301)

The **BOARD OF TRADE** has for disposal (a) about 506 tons Indian Crushed No. 1 Myrobalans, (b) about 109 tons Turkish Valonia Beard and (c) about 243 tons Italian Solid Chestnutwood Extract. The Myrobalans are in store near Nottingham, Cambridge, Doncaster and at Wrexham; the Valonia Beard near Nottingham, and the Chestnutwood Extract at Grantham. Full details, and Forms of Tender (returnable not later than 10 a.m. on 3rd January 1957), may be obtained from the Board of Trade, Commodity and General Division 7(b), Room 314, Lacon House, Theobalds Road, London, W.C.1. (Telephone: Chancery 4411, Extension 325).

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers, Valuers and Fire Loss Assessors of
CHEMICAL WORKS PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937(2 lines) Central Manchester.

PATENTS

The Proprietors of British Patent No. 692,840, for "AN IMPROVED PROCESS FOR THE OXIDATION OF METHANE AND ITS HOMOLOGUES TO FORMALDEHYDE," desire to enter into negotiations with a firm or firms for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

WANTED

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3, will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS LTD.
Plantation House
Mincing Lane,
London, E.C.2.

GRINDING, CRUSHING AND GRADING
FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. THOMAS HILL-JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON E.3. (TELEPHONE: EAST 3285).

Have you Reserved Your Space
in
**1957 ANNUAL
REVIEW NUMBER**

January 12

If not please write to:

The Publisher

THE CHEMICAL AGE
154 FLEET STREET, LONDON, E.C.4
or telephone FLEet Street 3212

CHEMICAL LEADWORK

Fabricated Lead Sheets and Pipes. Homogeneous interior Lead lining of flanged mild steel tubes, bends, and tees.

W. THOMASON & SONS, LTD.

Walton Works, Great Moor Street, BOLTON

Established 1875

Telephone 306

Classified Advertisement Order Form

To The Manager
THE CHEMICAL AGE
Bouverie House
Fleet Street, London E.C.4

Please insert the following in your next issue and for
weeks thereafter

Date

SITUATIONS VACANT	• EDUCATIONAL
OFFICIAL APPOINTMENTS	• WANTED
FOR SALE	• INVITATION TO TENDER
AUCTIONEERS, VALUERS, etc.	• PATENTS
WORK WANTED AND OFFERED	

CLASSIFIED RATES All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to 10 a.m. Tuesday for insertion same week.

SEMI-DISPLAY 30/- per inch. Three or more insertions 25/- per inch.

Name

Address

PIPEWORK FOR THE CHEMICAL INDUSTRY



Superior plant is the patent Agent in achieving economical production. Chemical plants require pipes and fittings that will give efficient service allied to well planned layout.

Shaw-Petrie and Clyde Tube Forgings Ltd., manufacture, fabricate and erect to the highest specification, a complete range of pipe-work—Seamless Steel and Alloy Butt Welding Fittings.



**SHAW-PETRIE
LIMITED**

**CLYDE TUBE
FORGINGS LTD**

NORTH HILLINGTON · GLASGOW SW2 · TELEPHONE HALFWAY 5551-6

LONDON OFFICE, 157 VICTORIA ST. SW1
TELEPHONE, TATE GALLERY 9325-6
AND AT SOUTH SHIELDS, LIVERPOOL
AND BELFAST

OVERSEAS
CANADIAN CLYDE TUBE FORGINGS
P.O. BOX 278 WESTON ONTARIO

<i>New Zealand</i>	<i>Barbados</i>	<i>Mexico and</i>
<i>East West</i>	<i>British Guiana</i>	<i>Venezuela</i>
<i>Central and</i>	<i>Jamaica</i>	<i>Belgium Holland</i>
<i>South Africa</i>	<i>Trinidad</i>	<i>Norway Sweden</i>
<i>Australia</i>	<i>Italy Spain</i>	<i>and Finland</i>
CLYDE TUBE FORGINGS	OF AMERICA	
POSTLAND OREGON	U.S.A.	

HFSO₃

FLUOSULPHONIC ACID

This is a colourless or pale straw-coloured, mobile, liquid which fumes in moist air.

It is a remarkably stable compound and can be redistilled in glass apparatus.

PHYSICAL PROPERTIES

Boiling point at 760 mm. 163°C.

Freezing point -87.3°C.

Sp. Gr. at 15.6°C. 1.743

Used as a catalyst in condensation and alkylation reactions; for the preparation of alkyl and aryl fluosulphonates, acyl fluorides and aromatic sulphonyl fluorides. As a tool in

preparative chemistry, it is similar to chlorosulphonic acid but is generally more stable.

With boric acid it gives boron trifluoride in an easily controlled reaction which forms a convenient method of generating small amounts of that gas.

It has been used in the electropolishing of certain metals.

Advice on materials of construction and on handling, may be obtained from



IMPERIAL SMELTING CORPORATION (SALES) LTD. • 37 DOVER STREET • LONDON • W.1.
PIONEERS IN FLUORINE DEVELOPMENT